THE IRON TRADE REVIEW

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LESS EXCITEMENT

BUT GREAT STRENGTH IN THE IRON AND STEEL MARKETS.

Sales Agencies Figuring on Importing Pig—Sheets Advance—Ore Rapidly Purchased at Small Advance.

The market continues exceedingly strong. While in some centers buying is not as brisk, that fact is attributed more to scarcity of material than to diminution of demand. There is still great interest in raw materials, and it seems certain that the trade will be compelled to recognize a considerably higher level of values. Practically all of the iron ore offered at an advance of 25 cents over the prices of 1905 has been purchased, and sellers now in the market or about to enter are firm in their opinion that an advance of 50 cents is justified. Heavy buying is expected before Christmas; in fact, it will not be surprising if all the ore that can be mined for delivery in 1906 is sold before the holidays. During the past week there were some indications, especially in the Chicago district, of lower prices for coke, but this slight tendency toward weakness seems to have been due to local conditions. Several of the large producers of coke are not on the market for immediate delivery. Owing to the uncertainty as to the future, very little contracting for coke is being done.

Pig iron has been quiet but firm. The general tendency is toward higher prices which have now reached a point in the east nearly as high as the cost of English and German irons delivered at tidewater, and large selling agencies are figuring on making heavy importations, if present conditions continue. The United States Steel Corporation has decided not to make further purchases of Bessemer for the present, as its view of market prices was somewhat lower than that of the furnace interests.

The Midvale Steel Co., of Philadelphia, has been in the market for 10,000 tons of Bessemer, and has purchased a considerable amount, some of which will be shipped from the Mahoning Valley, the price being about $17.35 at the furnace. Further evidence has appeared that western foundrymen will need more iron for their early requirements, and iron is very scarce in the Chicago district, where sales are being made on the basis of $14.50 Birmingham for Southern No. 2 Foundry, and $19.50 Chicago for Northern No. 2.

The most important transaction in Chicago was a purchase of 25,000 tons of Lake Superior charcoal by a car building interest, the deliveries extending through the first half of 1906. There is still some iron in the south which can be purchased at $14.00 but nearly all the furnaces are quoting $14.50. Northern No. 2 Foundry is quoted at $17.50 to $18.00 at Ohio furnaces. One interest which offered iron at $17.50 soon sold all of its available tonnage.

Activity in finished materials continues. Quotations on sheets have been advanced $2.00 per ton and on tin plate 10 cents per base box, but many consumers have covered for their requirements well into next year, and the new announcement is taken as indicating an improvement of the market rather than strict adherence to the higher quotations. It is expected that there will be advances on other simi-finished products at an early date, although manufacturers of plates just declined to advance prices.

There is still a surprisingly strong demand for steel rails, the principal sales of the week being: Illinois Central, 35,000 tons; Chicago, Milwaukee & St. Paul 5000; St. Louis and South Western, 12,000; Alaska Central, 5,000; Texas Pacific, 5,000; Seaboard Air Line, 6,700; Illinois tractions, 4,000. There is a good demand for light rails, and further advances are anticipated.

At a meeting of the wire manufacturers held in Chicago, steps were taken to prevent the continuance of the practice which has prevailed to some extent of quoting jobbers' prices for wire products to large retailers. It was decided not to be advisable to advance prices, but an effort will be made to maintain established differentials of the present rate card.

ILLINOIS STEEL CO. ELECTION.

(Special Telegram.)

Chicago, November 22, 1905.—At a meeting of the board of directors of the Illinois Steel Co., held this day, G. G. Thorpe, formerly general manager of the Clairton plant of the United States Steel Corporation, was elected second vice president. Assigned to his jurisdiction is the supervision and direction of new construction and mill improvements, with headquarters at the general offices of the company in the Rookery Building. The second vice president will report directly to the president.

William Davis, general superintendent of the Donora plant, has been appointed general manager of the Clairton plant and Fred. A. Corey, superintendent of the open hearth department of the North Carnegie steel works at Sharon, Pa., has been appointed general superintendent of the Donora plant to succeed Mr. Davis.

MANHATTAN BRIDGE ENJOINED.

(Special Telegram.)

New York, Nov. 22.—JustceDowling of the Supreme court yesterday granted an injunction in the suit brought by Peter A. Gage, a tax-payer, restraining the mayor, the bridge commissioner and others from entering into a contract with the Pennsylvania Steel Co. for the construction of the Manhattan bridge.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Prices of Sheets and Tin Plate Advanced—Ferro-Manganese Not Obtainable.

OFFICE OF *The Iron Trade Review*,
521 PARK BUILDING, November 21.

Conditions in this market are decidedly good, with a likelihood of an advance in semi-finished products as well as plates and shapes before the end of another week. Producers of finished material are in such shape now, and their order books filled for a period running from three to five months into the next year, that they feel an advance is warranted. The advance will probably come next week and be $2 per ton on plates and shapes, with a corresponding advance in merchant bars, billets and sheet bars.

The leading interest at the beginning of the week announced an advance of $2 per ton on sheets and tin plate, giving out a new official price, which may be used as showing the differential. Pig iron continues strong, Bessemer being quoted from $17.25 to $17.50, valley. Southern iron is quoted at $14.50, Birmingham, for the regular No. 2 grade, and Northern No. 2 foundry at $17.50 to $18, valley furnaces. The Midvale Steel Co. came into the local market the first part of the week with inquiries for 10,000 tons of Bessemer, and secured a part of its requirements at $17 to $17.50, valley furnaces, for part prompt and part first quarter delivery. There is but little Bessemer iron to be had.

Almost any price could be secured for ferro-manganese, and $90 has been offered freely, and in one or two instances $100 has been offered, but there is none to be had. The scarcity of cars is being felt more strongly each week.

Pig Iron.—Bessemer iron is scarce but considerable basic has been offered and sales made at $17.25, valley furnace. During the week the total sales of pig iron reported amounted to about 15,000 tons. This includes what the Midvale Steel Co., secured of the 10,000 tons of Bessemer upon which it made inquiries, and it is reported this concern covered a little over half of what it intended to buy. There was an inquiry out for 1,000 tons of charcoal iron but as far as could be learned no deal was closed. The steel corporation has decided not to buy at the present and will wait at least until next month. The high prices sometimes quoted are being forced upon the small consumers who did not cover for their wants far enough ahead in anticipation of the present high market We quote:

Bessemer, Valley	$17.25 to $17.50
Bessemer, Pittsburg	18.10 to 18.35
No. 1 Foundry, Pittsburg	18.35 to 18.60
No. 2 Foundry, Pittsburg	17.85 to 18.10
Gray Forge, Pittsburg	16.85 to 17.35
Basic, Valley	17.25 to 17.75
Basic, Pittsburg	18.10 to 18.60

Ferro-Manganese.—With ferro-manganese it is not so much a question of price as ability to furnish the goods. Practically every seller has withdrawn all quotations for delivery before March 1 of next year, and there have been no sales upon which to base a quotation, although there is no doubt $90 or even $100 per ton could readily be secured for prompt delivery. Some of the consumers have become scared at the scarcity and are offering fancy prices, but there is no ferro-manganese to be had. There has been an advance, within the past two weeks, of $25 to $30 per ton. This has been caused by the inability to get Russian ferro-manganese to this country, and no relief is in sight for the immediate future. To add to the difficulty, two of the big furnaces which have been making ferro-manganese have blown out.

Sheets.—The leading interest on Monday officially announced an advance in sheets amounting to $2 per ton, and 10 cents per base box on tinplate. The leading interest is now operating 92 per cent. of its sheet mills and 70 per cent. of its tin plate mills, a larger percentage than were ever operated before at this time of the year. The car shortage for the past 60 days has seriously hampered this industry, and still greater difficulty is anticipated throughout the winter months should the present winter not be an open one.

We revise quotations as follows: American Bessemer steel sheets, box annealed, one pass, cold rolled: Nos. 10-12, 1.90c; Nos. 13-14, 1.95c; Nos. 15-16, 2c; Nos. 17-21, 2.05c; Nos. 22-24, 2.10c; Nos. 25-26, 2.15c; No. 27, 2.20c; No. 28, 2.30c; No. 29, 2.40c; No. 30, 2.55c. Galvanized, Nos. 10-11, 2.25c; Nos. 12-14, 2.35c; Nos. 15-16, 2.45c; Nos. 17-21, 2.60c; Nos. 22-24, 2.75c; Nos. 25-26, 2.95c; No. 27, 3.15c; No. 28, 3.35c. Quotations f. o. b. Pittsburg for large lots.

Old Material.—The buying has been erratic and not consistent, and the mills are buying only as they get hard pressed and they are compelled to buy. Many of the mills have large stocks of pig iron bought around the $12 and $13 mark, and they will not pay present prices asked for scrap unless they are compelled to get it. We quote as follows, gross tons, delivered, Pittsburg district:

Heavy melting stock, $17.50 to $18; old steel rails, long length, $17.50 to $18; No. 1 cast scrap, $15 to $15.50; heavy cast scrap borings, $10.75 to $11; bundled sheet scrap, $15.50 to $15.75; No. 1 wrought scrap, $20.50 to $21; low phosphorous scrap, $20 to $21.

Rails and Track Material.—The demand for light sections still continues, and an advance of 50 cents is noted in the price of sections between 25 and 45 lbs. Within the past week the Gould roads contracted for 17,000 tons of standard sections. It is an impossibility to get prompt delivery, as mills are booked ahead far into the second quarter of next year. We quote as follows:

Fifty pounds and heavier, 500-ton lots and over, $28; carload lots and less than 500 tons, $30; less than carload lots, $32; light rails, 16-lb., $29 to $30; 20-lb., $27.50 to $28; 25 to 45 lb., $26.50; angle bars for standard sections, 1.50c; spikes, $1.10 to $1.95.

Billets.—Billets and sheet bars are scarce articles, but no advance in price has been made despite the advance in sheets and tin plate. We continue to quote $26 for Bessemer billets and $27 to $28 for open-hearth. Sheet bars are nominally $27.

Structural Material.—The market is just as strong if not stronger, than ever, and mills are from 60 days to five months behind on their contracts. While no advance has yet been made, the condition of order books of the mills is such that one may be expected most any time, and apply to plates and shapes. When the advance is made it will probably be $2 per ton. We quote:

Beams and channels, 15 in. and under, 1.70c; over 15 in., 1.80c; zees, 1.70c; tees, 1.75c; angles, from 3 to 8 in., inclusive, 1.70c; universal and sheared plate 6¼ in. and wider, 1.60c, base.

Pipes and Tubes.—Conditions in this market remain practically as they have been for the past six months, the leading interest running practically to capacity, and prices are unchanged. The demand for merchant pipe continues good, and oil country goods have not shown any particular brace. We quote in carload lots to consumers as follows, prices to big jobbers being one point lower:

	Steel		Iron	
Consumers' Carloads	Black	Galv.	Black	Galv.
⅛ and¼ inch	71	55	68½	52½
⅜ and ½ inch	75	63	72½	60½
¾ to 6 inches	79	69	77	67
7 to 12 inches	74	59	72	56½
EXTRA STRONG PLAIN ENDS.				
¼ to ¾ inch	64	52	61½	49½
½ to 4 inches	71	59	68½	56½
4½ to 8 inches	67	55	64½	52½
Double extra strong plain ends, ½ to 8 inches	60	49	75½	49½

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel	Iron
1 to 1½ inches	44	41
1¾ to 2¼ inches	56	41
2½ inches	58	46
2¾ to 5 inches	64	53
6 to 13 inches	56	41

2¾ inches and larger, over 22 feet, 10 percent net extra.

Merchant Bars.—With the prevailing scarcity in all semi-finished products there is a likelihood of an advance in merchant bars at the same time plates and shapes are advanced. For the week we continue to quote:

Common iron bars, 1.80c, Youngstown; 1.85c Pittsburg; hoops, 1.75c, and bands, 1.50c; taking hoop and band extras, respectively. Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angles, zees and tees under 3 in., 1.60c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 lbs., 10c advance; less than 1,000 lbs. of a size, 30c advance.

Wire and Wire Nails.—The big tonnage and liberal specifications in this market continue and for the present at least there is no indication of a change. We quote as follows:

Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85, and less than carloads, $1.95; painted barb wire, $1.95 for jobbers in carloads; retailers' carloads, $2, and less than carloads, $2.10, with 30c for galvanizing. Annealed smooth fence wire is held at $1.65, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in 10 days Iron and steel cut nails, $1.70 to $1.75.

Plates.—The demands of the steel car companies still continue to keep producers of plates busy attending to wants, and in other lines there has been no indication of a let-up. Mills have no opportunity to catch up, and the advance expected next week will put up the price of plates $2 per ton. We quote, unchanged, as follows:

Tank plate, ¼ in. thick, 6¼ in. to 100 in., 1.60c, f. o. b. mill Pittsburg. Extras are as follows per 100 lb.: Flange and boiler steel, 10c; marine, A. B. M. A. and ordinary fire box, 20c; still bottom, 30c; locomotive fire box, 50c; plates over 100 in. up to 110 in. in width, not less than 5c extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., not less than 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, 10c extra; gauges 7 and 8, 15c extra; No. 9, 25c extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except Pacific Coast.

Skelp.—With the high prices asked and the limited supply on the market, but little business is being done, the comparatively low price of pipe putting the unfinished product out of focus. We quote:

Bessemer steel, grooved, 1.65c to 1.70c; sheared, 1.70c; open-hearth, grooved, 1.65c; sheared, 1.75c; iron, grooved, 1.70c; sheared, 1.75c to 1.80c.

Muck Bar.—Eastern producers are offering muck bar at $30.75, and local bar for re-sale has been offered at $31. Producers in this district have none to sell, and the lot offered for re-sale is put out by a consumer with a large quantity who is out to take advantage of the high price and prevailing scarcity.

Coke.—Several of the large producers are not on the market for spot coke, and are making no quotations for first quarter or first half delivery. Producers who are on the market are asking $4 to $4.10 for spot foundry coke, and from $3.75 to $4 for the first half of next year. In most instances only old customers are being cared for. Furnace coke is quoted at $3 to $3.10 for prompt, and as high as $3.25 for first half of next year. Production for the week ending November 11 is estimated at 275,468 tons for the Connellsville region and 89,232 for the lower Connellsville region.

CHICAGO.

Meeting of Wire Manufacturers—Scarcity of Pig—Large Sale of Charcoal Iron.

Office of The Iron Trade Review,
1164 Monadnock Block, Nov. 21.

Every branch of the market shows strength. The wave of buying has subsided somewhat, but it has left prices safely fixed at their present levels. In pig iron and billets further advances are imminent. The former is selling at $18.15 Chicago for Southern No. 2 foundry, and at $19.50 for Northern No. 2. These, however, are minimum prices and apply only on new tonnage for immediate shipment. Several furnaces are asking 50 cents above these figures for deliveries next year. Forging billets are firm at from $33 to $35, but owing to their great scarcity any unwonted demand would quickly lift them to higher levels. The demand for pig iron last week was light, the only transaction of interest being the purchase of 25,000 tons of Lake Superior charcoal by a large carbuilder. Coke is easier than for some weeks, and standard 72-hour Connellsville brands are offered on the basis of $3.75 ovens. The specifications for rolled material continue without cessation; with some mills they are 50 per cent in excess of their capacity. Contracts for rails last week amounted to 35,000 tons, all of which was turned over to the Carnegie Steel Co. by the local mill. An advance is expected in light rails, as western makers have nothing to offer inside of three months' delivery. Black sheets were put up $2 a ton yesterday and are now quoted at 2.30c Pittsburg for No. 28 gauge. The galvanized product was undisturbed, though it is expected an increase will be announced shortly. Cast iron pipe was advanced $1 a ton on Monday, the local carlond price for 4-inch being $31. A conference of representatives of several independent wire manufacturers in Chicago yesterday resulted in an agreement to discontinue the practice of quoting jobbers' prices to the retail trade, and hereafter the differentials of the present schedule will be strictly maintained. There is a good demand for bar iron, and prices are firm at 1.85c Chicago. The inquiry for 8,500 tons mentioned a week ago has developed into an order, the contract having been divided among several western plants. Scrap is strong and values are higher.

PIG IRON—It becomes increasingly evident each week that a large number of western foundrymen have either not covered for their requirements in the first half or have under-estimated their consumption for that period. Many inquiries and orders have come from melters whose wants

were supposed to be protected, and the willingness of these buyers to pay the prices demanded is illustrative of their exigencies. Pig iron is scarce in this market and hard to obtain, especially for delivery in the first quarter of next year. Some iron is available for immediate shipment. This is being rapidly sold on the basis of $14.50 Birmingham for Southern No. 2 foundry, and $19.50 Chicago for Northern No. 2. For deliveries next year, several furnaces have advanced their prices 50 cents a ton, and it is admitted the market would require little coaxing to establish itself on the higher basis. Malleable Bessemer is extremely scarce, and while it is possible in some quarters to buy it at $19.50 Chicago, $20 is asked by the majority of sellers. Charcoal iron is firm at $20, or $18.50 furnace. The only transaction of importance last week was the purchase of 25,000 tons of Lake Superior charcoal by a carbuilding interest, the deliveries extending through the first half. Trading in other grades was of fair proportions, though the market lacked the snap and vigor of a few weeks ago. Many furnaces are declining to add to their present obligations in view of the strong possibilities of higher prices ruling at a later date. We have revised our quotations, and give the following prices:

Lake Superior charcoal	$20.00
Northern Foundry No. 1	$20.50 to 21.00
Northern Foundry No. 2	19.50 to 20.00
Northern Foundry No. 3	19.00 to 19.50
Northern Scotch Foundry	20.50 to 21.00
Ohio Strong Softeners No. 1	19.80 to 20.30
Ohio Strong Softeners No. 2	19.30 to 19.80
Southern Foundry No. 1	18.65 to 19.15
Southern Foundry No. 2	18.15 to 18.65
Southern Foundry No. 3	17.65 to 18.15
Southern Foundry No. 4	17.40 to 17.90
Southern No. 1 Soft	18.65 to 19.15
Southern No. 2 Soft	18.15 to 18.65
Southern Gray Forge	16.15 to 16.40
Southern Mottled	15.65 to 16.15
Southern Silveries (4 per cent to 6 per cent Silicon)	18.65 to 19.15
Jackson Co. Silveries....6%, 18.80; 8%, 20.80; 10%	21.80 to 22.30
Alabama and Georgia Car Wheel	21.15 to 21.65
Malleable Bessemer	19.50 to 20.00
Basic Iron	18.65 to 18.90

BILLETS—No change is noted in the local situation. Forging billets are in good demand, and are quoted by the local seller at $33 to $35, for all sizes up to but not including 10x10. Wire rods are unchanged at $33 Pittsburg, and $35 for chain rods.

BARS—The transaction of chief importance last week was the purchase by the Illinois Central of 8,500 tons of bar iron, which it is understood was bought at less than the present price. The general market is firm at 1.85c to 1.90c Chicago, the order above mentioned being taken at about 1.80c. The general demand for bar iron is of excellent proportions and early delivery of new tonnage is impossible to obtain. Makers of steel bars are also glutted with specifications, despite the fact that their entire output goes into immediate consumption. The congestion is the most keenly felt on the smaller sizes of material, and it will be months before mills are caught up on their orders. Prices of steel are very firm and without change. We quote carload lots, mill shipments, Chicago delivery, as follows: Soft steel bars and bands, 1.66½c, half extras; soft steel angles, less than 3x3, 1.76½c; hoops, 1.91½c base, full extras; hard steel angles, 1.60 to 1.65c. Demand from store is good and prices are firm. We quote bar iron, 1.95c to 2c base, full extras; soft steel bars and bands, 1.85c base, half extras; soft steel angles, channels and tees, under 3 in., 1.95c; hoops, 2.20c to 2.30c base, full extras.

SHEETS—Makers of black sheets advanced prices $2 a ton yesterday. This announcement has been expected for some time, though the change was not made until after the majority of consumers had covered for their requirements as far ahead as April, and in some cases, to June. The advance puts black sheets on the basis of $2.30 Pittsburg for No. 28 gauge. Several independent makers that had withdrawn from the market because they could not meet the old competition are now actively seeking business, and a livelier market is expected to prevail as a result. Galvanized sheets were not changed. We quote mill shipments, Chicago delivery, as follows: Blue annealed sheets, Nos. 9 and 10, 1.81½c to 1.86½c; Nos. 11 and 12, 1.86½c to 1.91½c; Nos. 13 and 14, 1.91½c to 1.96½c; Nos. 15 and 16, 2.01½c to 2.06½c. On box annealed, one pass, cold rolled, we quote: Nos. 18 and 20, 2.21½c to 2.26½c; Nos. 22 and 24, 2.26½c to 2.31½c; Nos. 25 and 26, 2.31½c to 2.36½c; No. 27, 2.36½c to 2.41½c; No. 28, 2.46½c to 2.51½c; No. 29, 2.56½c to 2.61½c. For lots from warehouse stocks, we quote as follows: No. 10, 2.15c to 2.20c; No. 12, 2.20c to 2.25c; No. 14, 2.25c to 2.30c; No. 16, 2.35 to 2.40c; Nos. 18 and 20, 2.50 to 2.55c; Nos. 22 to 24, 2.55c to 2.60c; No. 26, 2.60c to 2.70c; No. 27, 2.75c to 2.80c; No. 28, 2.85c to 2.90c; No. 29, 3c to 3.05c. Galvanized sheets, mill shipments, Chicago delivery, are quoted as follows: Nos. 12 and 14, 2.36½c to 2.41½c; No. 16, 2.51½c to 2.56½c; Nos. 18 and 20, 2.66½c to 2.71½c; Nos. 22 and 24, 2.81½c to 2.86½c; No. 26, 3.01½c to 3.06½c; No. 27, 3.21½c to 3.26½c; No. 28, 3.41½c to 3.46½c; No. 29, 3.66½c to 3.71½c. Jobbers' prices on small lots from store are as follows: Nos. 10 to 14, inclusive, 3.10c; No. 16, 3c; Nos. 18 and 20, 3.10c; Nos. 22 and 24, 3.25; No. 26, 3.50; No. 27, 3.70; No. 28, 3.05; No. 29, 4.40; No. 30, 4.85c.

STRUCTURAL STEEL—The situation is without material change. Specifications are heavy and premiums are exacted by some sellers for quick shipments. Prices are without change, mill shipments, Chicago delivery, being as follows: Beams and channels, 3 to 15 in., inclusive, 1.86½c; angles, 3 to 6 in., 1.86½c; angles larger than 6 in., on one or both legs, 1.96½c; beams larger than 15 in., 1.96½c; zees 3 in. and over, 1.86½c; tees 3 in. and over, 1.91½c; with the usual extras for cutting to exact lengths, punching, coping, bending, or other shop work. We quote prices from store as follows: Angles, 2.25c to 2.35c; beams and channels, base sizes, 2.25c to 2.75c; tees and zees, 2.30 to 2.35c. These prices are for either random lengths or cut to specifications in excess of 5 ft.

PLATES—The failure of the effort to advance prices at the meeting of the plate association held last week was pleasing to western sellers, who are averse to any change in the present schedule being made now. New business is of good volume and specifications are 50 per cent in excess of the local mill's capacity. We quote carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼ in. and heavier, up to 100 in. wide, 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base, all full extras. Plates, 3-16 in. thick, $2 extra; gauges 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Jobbers report a good movement from local stocks, with store prices firm. We quote on small lots as follows: Tank steel, ¼ in. and heavier, up to and including 72 in. wide, 2c to 2.10c; over 72 in. wide up to 100 in., 2.10c to 2.20c; over 100 in. wide, usual mill extras; 3-16 in. up to but not including 72 in. wide, 2.10c; 3-16 in., 72 in. wide, 2.35c; flange steel, 25c extra; heads, 25c extra.

RAILS AND TRACK SUPPLIES—Contracts for standard sections aggregating 35,000 tons were turned over to the Carnegie Steel Co. by the local mill last week. Of this amount, 25,000 tons were for the Harriman Lines, which is in addition to the order for the same amount placed the week previous. There is a good demand for light rails, and western mills are sold up for the next three months. An advance is looked for in this product at an early date. Track supplies are also selling freely, the demand being especially heavy for spikes and bolts. We quote heavy sections in 500-ton lots, f. o. b. mill, $28; less than 500 tons to car lots, $30; less than carload lots, $32. Light rails, f. o. b. Milwaukee, mill: 12-lb. sections, $31; 16-lb., $30; 20-lb., $29; 25-lb., $28; 30, 35, 40 and 45-lb. sections, $26.50. Track supplies, f. o. b. Joliet, are as follows: Angle bars, 1.50 to 1.75, accord-

ing to tonnage; spikes, first quality, 1.85 to 1.95c; track bolts, 3¼x¾, with square nuts, $2.50 to $2.60 per 100 lbs.; with hexagon nuts, $2.65 to $2.80.

MERCHANT STEEL—Specifications continue very heavy, and in many cases beyond the capacity of mills. Prices are firm and without change. We quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35 to 2.40c; smooth finished machinery steel, 1.91½c; smooth finished tire, 1.86½c; plow steel, 2.20 and upward, according to quality; toe calk steel, 2.21c; railway spring, 1.86½c. Cold rolled shafting, 50 and 2½c per cent off to dealers, 50 per cent off in carload lots, and 45 per cent in less than carload lots. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and up.

CAST IRON PIPE—Current demand is of light proportions, the high prices of pig iron having retarded the movement in pipe. An advance of $1 a ton went into effect today. We quote carload lots, f. o. b. Chicago: 4 in. water pipe, $31; 6, 8, 10 and 12 in., $30; larger sizes, $29.50; gas pipe, $1 extra.

MERCHANT PIPE—While there is a fair demand for pipe for this season of the year, the market is a waning one. It is noticeable that independent makers are not encouraging new business to any extent as a result of the low prices prevailing. We continue to quote ¾ to 6 in. black steel pipe, carload lots, mill shipments, 78.35 per cent discount from list, f. o. b. Chicago. Local jobbers are asking 76½ to 77 per cent for shipments from stock.

BOILER TUBES—The market is a strong one, prices being firm and demand heavy. Shipments from mills are slow and some jobbers are having difficulty in keeping their stocks replenished. Prices are without change. We quote carload lots, Chicago delivery, as follows:

	Steel.	Iron.	Seamless.
1 to 1½ inches	40.35	37.35	53.00
1¾ to 2¼ inches	54.35	39.35	40.00
2½ inches	56.35	44.35	43.00
2¾ to 5 inches	62.35	51.35	
Up to 4½ inches			50.50
6 to 13 inches	52.35	37.35	

Less than carload lots from store, as follows:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches, inclusive	40	35	42½
1¾ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	30
2¾ to 5 inches, inclusive	60	47½	42½

WIRE PRODUCTS—The practice of quoting jobbers' prices to large retailers of wire products, which has been followed for some weeks by several makers, will be abolished from today. At a conference in Chicago yesterday of representatives of the interests reported to have been doing this, it was agreed to discontinue the cutting, and to rigidly maintain the established differentials of the present rate card. Some discussion was indulged in on the advisability of advancing prices $1 a ton, but it was not thought proper to make any change at the present time. Demand for nails and other wire products continues good, stocks being reported low and consumption unusually heavy. We quote carload lots, mill shipments, Chicago delivery, to jobbers, as follows: Wire nails, $1.95; painted barb wire, $2.10; galvanized barb wire, $2.40; smooth annealed wire, $1.80; smooth galvanized wire, $2.10; polished staples, $2.10; galvanized staples, $2.35. Carload lots to retailers, 5 cents higher than above prices; less than carload lots, 15 cents higher are quoted.

COKE—Prices have receded from 25 to 50 cents a ton on Connellsville coke, and standard 72-hour brands are now offered at $3.75 to $3.85 f. o. b. ovens. These prices are not expected to remain in force long, as the first heavy frost or snowfall will create another blockade or scarcity of cars at eastern points and this will be followed by a sharp demand for coke and another advance in price. The weakness that has followed the active market of two weeks ago was due to the heavy western shipments from Connellsville ovens. Much of this tonnage remained on the local tracks, and to escape demurrage charges was sold at prices that would remove it quickly. Contracting last week was light, the trading being confined to the purchase of spot coke.

OLD MATERIAL—The local situation is without material change. Western mills are buying lightly at present prices, renewing their stocks by occasionally picking up a carload which is offered below the market because of accumulating demurrage charges. The large dealers, however, show no disposition to change their views on values, and are bidding as freely and actively as ever for the railroad offerings. Most of this tonnage is either put in storage or shipped to eastern centers, where the supply is not so plentiful. We have advanced old steel rails and No. 2 railroad wrought 25 cents a ton each, and steel car axles, 50 cents a ton. Our prices on gross tons are as follows:

Old Steel Rails (4 feet and over)	$17.25 to 17.75
Old Steel Rails (less than 4 feet)	16.00 to 16.50
Old Iron Rails	23.00 to 23.50
Relaying Rails, subject to inspection	26.50 to 27.00
Heavy Melting Steel	15.00 to 15.50
Mixed Country Steel	12.50 to 13.00

For net tons we quote as follows:

No 1 R. R. Wrought	$17.50 to 18.00
No 2 R. R. Wrought	17.00 to 17.25
Shafting	18.00 to 18.50
Dealers' Forge No. 1	14.50 to 15.00
Wrought Pipe and Flues	12.50 to 13.00
No. 1 Cast, 150 lbs. and less	14.50 to 15.00
No. 1 Mill	9.50 to 10.00
No. 1 Busheling	12.50 to 13.00
No. 2 Busheling	12.25 to 12.75
Country Sheet	8.50 to 9.00
No. 1 Boilers Cut	12.50 to 13.00
Boiler Punchings	15.00 to 15.50
Iron Car Axles	23.50 to 24.00
Steel Car Axles	19.00 to 19.10
Iron Axle Turnings	11.50 to 12.00
Cast Borings	10.00 to 10.50
Mixed Borings, etc	10.00 to 10.50
Machine Shop Turnings	11.75 to 12.25
Railroad Malleable	15.00 to 15.50
Agricultural Malleable	14.00 to 14.50
Stove Plate and Light Cast Scrap	12.00 to 12.50
Old Iron Splice Bars	19.50 to 20.00

CLEVELAND.

Many Inquiries for Ore.—Pig Iron Market Quiet but Firm. Sheet Prices Advanced.

Iron Ore.—Many furnace men have been inquiring for ore within a few days, and one seller said he could easily have disposed of 750,000 tons at an advance of 25 cents over the prices of last year. The ore which was offered at that advance was sold rapidly, and there is now practically no ore to be had at less than 50c more than the quotations of last year. The sellers now in the market, and those expecting to come in within a few days, hold firmly to the opinion that a 50 cent advance is not too much. They assert that it is inevitable that as the years pass and the supplies of the highest grades of ore are diminished more rapidly than new mines are discovered, a higher level of prices for ore must be established. As one seller expressed it, the time has passed when every one, figuratively speaking, can go to the barrel and get a big ripe apple, for some must be satisfied with the smaller apples, even if there are a few blemishes. In other words, it is becoming necessary to a constantly increasing extent, to use the lower grades of ore. It is expected that within a week or two furnace interests will place very heavy orders for ore, and that before Christmas about all the ore which can be mined for delivery next year will be sold.

Lake freights are being held to the old figures, based on 75 cents from the head of the lakes, and there is no prospect of a change. The favorable weather of the past week has made it possible to move a heavy tonnage of ore.

Pig Iron.—The market is strong but quiet. One company which offered iron for delivery the first quarter at $17.00 at the furnace, soon sold all the iron which it had to offer, and the prevailing quotation is now $17.50 for No. 2 Foundry

as well as for Bessemer and basic. The coke situation is somewhat improved, and although quotations show little change there is reason for hoping that they will not advance to the high figures which have recently been predicted. If furnace coke does not advance beyond $3.25 for strictly Connellsville grades, conditions in the pig iron market will be more settled and it is probable that the sales for the second and third quarter of 1906 will increase. Iron for the remainder of this year and the first quarter of next is extremely scarce, and the only prospect for the relief of those who have not covered their full requirements seems to be in importations from England and Germany. We quote f. o. b. Cleveland as follows:

Bessemer	$18.35 to 18.85
No. 1 Foundry	18.50 to 19.00
No. 2 Foundry	17.85 to 18.35
No. 3 Foundry	17.00 to 17.25
No. 2 Southern	17.85 to 18.35
Gray Forge	16.50 to 17.00
Gray Forge, Southern	15.85 to 16.35
Lake Superior charcoal	19.00 to 19.50

Finished Material.—Although there has recently been considerable cutting on announced prices of sheets, the market has steadily improved over the very decided irregularity of a few months ago, and the announced quotations on blue annealed have been advanced $1.00 while on Bessemer and galvanized there has been an advance of $2.00. There is some uneveness in prices on boiler tubes, but the demand is very fair. Bar iron continues strong at 1.85c at the Youngstown mills. The railroads are doing very well in shipping products from Cleveland, but local jobbers have difficulty in having shipments made from the mills.

Old Material.—The market continues its remarkable strength with advances in heavy steel, car wheels and old iron rails. Heavy steel has been particularly active, with a number of sales, one a lot of 800 tons at close to the top figure quoted. An Eastern consumer entered the local market during the week and secured some heavy melting steel direct from the producer. We quote, Cleveland delivery as follows:

Old iron rails	$25.00 to 26.50
Old steel rails (over 6 feet)	16.00 to 17.00
Old steel rails (under 6 feet)	17.00 to 18.00
Old car wheels	17.00 to 17.50
Steel boiler plate	14.00 to 15.00
Steel axles	20.00 to 21.00
Malleable iron (railroad)	16.00 to 17.00
Malleable iron (agricultural)	15.00 to 16.00
Heavy steel	17.00 to 17.50

We quote as follows, net tons:

No. 1 R. R. wrought	17.50 to 18.00
No 1 busheling	14.00 to 15.00
No. 1 machine cast	13.75 to 14.25
Iron axles	22.50 to 23.50
Axle turnings	11.50 to 12.50
Wrought turnings (free from cast)	11.00 to 12.00
Grate bars	9.00 to 9.50
Pipes and flues	13.00 to 14.00
Tank iron	11.00 to 11.50
Hoop and band iron	8.00 to 9.00
Sheet iron	7.00 to 8.00
Wrought drillings	11.00 to 12.00
Stove plate	10.50 to 11.00
Cast borings	8.50 to 9.50

CINCINNATI.

Pig Iron Market Less Active, But Small Lots Total Fair Volume of Business.

November 21, 1905.

Pig Iron.—The market has been less active the past week than in the preceding one, but still there was a fair volume of business made up mainly of 100 to 500 ton orders. A few transactions of 1,000 tons and over, however, were reported. An Ohio agricultural implement manufacturer took 1,000 tons of southern iron at $14.00 Birmingham and another sale of southern iron was made in central Ohio of 1,500 tons at the same price. Northern irons, so far as southern Ohio furnaces are concerned, are mainly on the basis of $18.00 furnace for No. 2 foundry, although we hear of occasional sales for second quarter delivery on the basis of $17.50 at furnace. Some of the transactions in southern irons for smaller tonnages have been on the basis of $14.50 Birmingham. The Virginia company has advanced its price to $16.00 furnace for delivery over the first half of next year. Grey forge, which has been plentifully offered, is showing a firmer tone with sales mainly at $13.00 Birmingham. The situation continues strong and the several large producers who have been out of the market for several weeks are still declining to quote. The situation is regarded as very acute and would be quick to respond to any increase in the demand by a sharp advance. It is believed, however, that most consumers have covered their first quarter requirements and the falling off in inquiry this week is taken as an indication that buying will be less active for the present at least.

Jackson County 8 percent silvery is still quoted at $19.00 at the furnace. It is reported that ferro-manganese has gone to $80.00 to $90.00 per ton f. o. b. Baltimore. Bessemer iron has been sold in the valleys at $17.35 for shipment to Philadelphia, indicating extreme scarcity of this grade in the east.

Southern Foundry No. 1	$17.25 to 17.75
Southern Foundry No. 2	16.75 to 17.25
Southern Foundry No. 3	16.25 to 16.75
Southern Foundry No. 4	15.75 to 16.25
Southern Foundry No. 1, soft	17.25 to 17.75
Southern Foundry No. 2, soft	16.75 to 17.25
Gray Forge	15.75 to 16.00
Northern Foundry No. 1	19.15 to 19.65
Northern Foundry No. 2	18.65 to 19.15
Northern Foundry No. 3	18.15 to 18.65
Jackson County Silvery, 8 percent	20.15 to 20.65
Southern Charcoal	19.75 to 20.25

Finished Material.—The market remains firm with no change in prices. There is increased difficulty in getting mill shipments forward and in addition to the crowded conditions of the mills the railroad situation is bad. Bar iron is quoted at 1.70c to 1.75c; steel bars at 1.63c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets No. 10 and No. 12, in car lots are 2.48c. We quote black sheets, No. 27 at 2.30c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2c. Tank plates are firm and sell out of store at 2c for ¼-in. and 2.10c for 3-16, Nos. 8 and 10. Beams and channels are quoted at 2.25c to 2.50c from stock and angles at 2c to 2.05c for base sizes.

In merchant pipe the demand continues good with prices showing no quotable advance, but indications are that the schedule of the leading interests is being more closely observed by independent mills. We quote f. o. b. Cincinnati:

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛ and ¼ inches	69.7	53.7	67.2	51.2
⅜ and ½ inches	73.7	61.7	71.2	59.2
¾ to 6 inches	77.7	67.7	75.7	65.7
7 to 12 inches	72.7	57.7	70.7	55.2

Old Material.—The market remains firm with a good demand. Holders are firm in their views and prices have an advancing tendency. We quote f. o. b. Cincinnati:

Old No. 1 railroad wrought, net tons	$17.50 to 18.00
Cast machine and foundry, net tons	14.00 to 14.50
Old iron rails, gross tons	23.50 to 24.00
Old steel rails, gross tons	16.50 to 17.00
Old short lengths, gross tons	17.50 to 18.00
Old iron axles, net tons	23.50 to 24.00
Stove plate, net tons	10.50 to 11.00
Wrought turnings, net tons	11.00 to 12.00
Cast borings, net tons	9.00 to 9.50
Car wheels, net tons	16.50 to 17.00

Coke.—The market continues firm and there have been some advances in quotations. Inquiry is mainly for prompt shipment coke and some consumers are asking for prices over the first half of next year but ovens are generally declining to make contracts. The car supply in the various

districts is inadequate for the wants and one producer in the Virginia district reports receiving only 91 cars last week while the actual requirements for current sales called for 300 cars. Prices in the various coke producing districts are as follows:

†Wise County, Va. Furnace Coke prompt shipment.	$ 3.00 to 3.25 per ton
Wise County, Va. Foundry Coke prompt shipment.	4.00 per ton
Pocahontas Furnace Coke on contracts	
Pocahontas Foundry Coke on contracts	
Connellsville Furnace Coke prompt shipment	3.00 to 3.25 per ton
Connellsville Foundry Coke prompt shipment	3.90 to 4.25 per ton
New River Foundry Coke on contracts or prompt ship't.	3.75 per ton
New River Furnace Coke, prompt shipment	3.00 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.65 per ton on $9.00 pig iron, plus 17 percent of the advance on pig iron above $9.00 Birmingham.

NEW YORK.

Lull in Buying all Along the Line.—Pig Iron Situation Stronger Than Ever.—More Large Orders for Rails.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., November 20.

Pig Iron.—Sales for the week have been light, but the strength of the situation grows more apparent every day. The market is extremely sensitive to reports of inquiries and sales, the slightest departure from the ordinary being sufficient to induce a revision of figures. Nor has the actual volume of business been inconsiderable. The average of transactions in small lots has been well up toward the normal. Some large inquiries are still going the rounds, among others one or more from leading pipe founders. Among the small transactions reported during the week were sales of 800 tons of No. 2 eastern Pennsylvania foundry at $17.50 and 500 tons of No. 2 Virginia foundry at $16.00. About 1,000 tons more of Buffalo foundry was secured for the pump works at Cambridge, Mass. Among inquiries appeared a call from a Connecticut rolling mill for 1000 tons of high silicon iron and several from manufacturers of machinery aggregating 2000 tons of standard foundry. Prices of all grades of pig iron have hardened in spite of the small sales. Eastern Pennsylvania producers are now asking $17.50 at the furnace and in some cases even as high as $18. Virginia No. 2 is held firmly at $16 and Alabama at $14.50, furnace is not a drug on the market by any means. The growing difficulty of transportation has not prevented a reduction of stocks and continued request to hurry shipment on old orders shows that there is no surplus of spot iron.

The following are prices at tidewater:

Northern No. 1 Foundry	$18 50 to 18 75
No. 2 Foundry	18.00 to 18.50
No. 2 Plain	17 00 to 17.75
No. 1 Southern Foundry	18.00 to 18.75
No. 2 Southern Foundry	17.50 to 18.25
No. 3 Southern Foundry	17.25 to 18.00
No. 4 Foundry	17.00 to 17.25

Pig Iron Certificates.—Trading in pig iron certificates and warrants on the New York Produce Exchange has been fairly active. Prices on both foundry and regular classification were slightly higher. January foundry, 200 tons, was sold at $17.40 and 500 tons of regular for March delivery wrought $17.55. Dayton gray forge, 500 tons, for spot delivery was sold at $13.10. Other sales were: 200 tons March regular at $17.50 and 100 tons regular for delivery during the same month $17.55.

Foundry iron warrants follow:

	Bid.	Asked.
November	17.00	17.50
December	17.10	17.50
January	17.30	17.75
February	17.45	18.00
March	17.45	18.00

Finished Iron and Steel.—As compared with the activity of recent weeks all grades of finishing materials have been comparatively quiet, if a market in which premiums are common can be called quiet. The demand for structural shapes especially in small lots continues as urgent as ever, and new business in larger units is beginning to appear. There is little or no change in the plate situation. The association met during the week and again declined to advance prices. The official price remains the same, but premiums were sanctioned and even encouraged. Only very few of the large tonnages of rails and structural material which have been under negotiation for some time have been released. Among the sale of rails were the following: Illinois Central, 35,000 tons; Illinois Traction, 4,000; Chicago, Milwaukee, St. Paul, 5,000 tons. Another road has placed an order for 10,000 tons. The American Bridge Co. has secured the contract for 2900 tons of bridge material to be delivered to the Duluth, Mesaba and Northern railroad, and also an order for 2000 tons of material for an extension of the Fischer Building in Chicago. The small orders for structural steel aggregate some 10,000 tons. Transportation difficulties are interfering with the work at the structural mills.

The following are prices at tidewater: Angles, 3 to 6 in. x ¼ in. and heavier, 1.84½c; beams, 3 to 15 in., 1.84½c; tees, 3 x ¼ in. and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine and ordinary fire box, 1.94½c; refined iron bars, 1.70½c; soft steel bars, 1.64½c; to 1.79c; sheets in car load lots New York, black 2.40c.

Old Materials.—The demand is improving for all classes of scrap material no one line appearing to be in better position than the others. The strong position of pig iron has naturally strengthened the market for scrap and it has been found that stocks are not so large as had been reported. Of wrought railroad sales were made of 900 and 300 tons, the railroads being the principal sellers. Several carloads of wrought yard scrap also changed hands and there were a number of offers for heavy melting steel material. The following are prices at tidewater approximately:

Old iron rails	$21.00 to 23 00
Old steel rails, long lengths	15.50 to 16.00
Old steel rails, short pieces	15.00 to 15.50
Relaying rails	23.00 to 24.00
Old car wheels	16.00 to 16.50
Old iron car axles	24.00 to 25.00
Old steel car axles	19.00 to 19.50
Heavy melting steel scrap	15.50 to 16.00
No. 1 railroad wrought scrap	20.00 to 21.00
Iron track scrap	18.50 to 19.00
Wrought pipe	14.00 to 15.00
Cast borings	10.00 to 10.25
Wrought turnings	14.50 to 15.50

PHILADELPHIA.

Temporary Lull in Pig Iron, but Higher Prices Are Expected.— Bar Iron is Strong.

Pig Iron.—After the price advances which have marked nearly every week for the past two months there is a temporary lull—a sort of breathing spell, so to speak, before producers and buyers begin to grapple with the problems which the approach of winter makes almost inevitable. The belief is still entertained that higher figures are bound to rule, but for the present furnacemen seem willing to quote last week's prices for such orders as they care to book. It is significant of the demand that many buyers are seeking to anticipate deliveries—a course not favored by the sellers. With $18.50 as the basis for standard brand of No. 2 X foundry, some particularly choice iron has sold as high as $19.00, but the lower figure is the prevailing quotation. Buyers are still urgent, but producers can do no more for them than they are now doing, with all furnaces running at full capacity. Prices are very firm and, though some inferior iron is sold at concessions, may be quoted as unchanged from last week as follows:

No 1X Foundry	$19.00 to 19.25
No. 2X Foundry	18.50 to 18.75
No. 2 Plain	18.00 to 18.25
Standard Gray Forge	16.50 to 16.75
Basic	17.75 to 18.25
Low Phosphorus	23.00 to 24 00
Southern No. 2X, rail	18.00 to 18.50
Southern No. 2X, dock	17.50 to 18.00

Finished Material.—Bar iron is now quoted at 1.75 to 1.85c. and is in growing demand. Other lines, in all of which there is great activity, continue unchanged in quotation. In the meantime prices, which are more or less nominal, may be quoted as follows: Beams, channels and angles, according to specifications, 1.82½c to 2.50c; refined iron bars 1.75c to 1.85c; steel bars, 1.63½c to 1.83c; plates, 1.73½c to 1.83½c.

Old Material.—Scrap, like pig iron, is momentarily resting after its series of advances. Considerable buying is being done, and the mills seem disposed to think that present prices are quite high enough. Dealers, on the other hand, point to the usual difficulties of collections in winter as likely to work for higher figures. In the meantime prices may be said to remain unchanged.

The Metal Market.

NEW YORK.

November 20

Pig Tin.—Prices are higher but the market has not been very active. Today's quotations follow. Spot 33.25 to 33.55; November 33.15 to 33.35; December 33⅛ to 33½; London £152 and £153. Arrivals for the month to date, 1,545; afloat 2,675.

Copper.—There was a fair volume of business during the week and prices are higher. Today's closings follow: Lake and electrolytic, 16⅝ to 16⅞; casting, 16⅜ to 16¾. London's closing today: £75 15s and £73 5s. Exports for the month to date, 7,683 tons.

Lead.—The local market has been active and excited and prices are higher. Today's closings: 5.45 to 5.65; St. Louis, 5.40c; London, £15 10s.

Spelter.—The demand for refined spelter has been only prices are higher. Today's closings: 5.45c to 5.65c; St. Louis, 5.40c; London, £15 10s.

CHICAGO.

Office of the Iron Trade Review,
1164 Monadnock Block, Nov. 21.

The demand for metals is of the strongest character. Melters covering freely for requirements as far ahead as sellers will permit. Copper and pig lead are especially active and it is difficult to get shipments of new tonnage earlier than February next. Copper, pig tin and lead are each higher in price. Spelter is also strengthening, the demand being more active than formerly. We have revised our prices, and quote as follows: Lake copper in carload lots, 17¼c to 17½c, and in small quantities, 17½c to 17¾c. Casting copper is 17c to 17¼c for carloads and 17¼c to 17½c for less than carload lots. Tin, 34c to 34¼c for carload lots. Spelter, 6.05c to 6.10c for carloads, and 7c to 7¼c for lesser quantities. Pig lead, 5¼c for 50-ton lots, and 6¼c to 6¾c for carload lots, with spot selling as high as 6c. Antimony is without change, Hallett's being quoted 15c, and Cookson's 16c. Nickel, 50c to 60c, according to amount and deliveries.

Old metals are selling freely, and at higher prices. Dealer's selling prices are approximately as follows: Copper wire, 14.75c; copper, heavy, 14.65c; light copper, 13.65c; red brass, 13.75c; red brass borings, 11.75c; tea lead, 14.25c; zinc, 4.60c; pewter, 25c.

Frederick Henry Betts, counsel in famous patent cases for the General Electric Co., the Westinghouse companies and other industrial interests, died recently at his home in New York. He was one of the best known patent authorities in the country.

PERSONAL.

S. A. Watson, formerly sales agent in the New York office of the American Steel Foundries, has been appointed manager of the Thurlow, Pa., plant.

R. E. Mathot, Brussels, Belgium, will spend some weeks in the United States consulting for various gas engine manufacturers. He is well known in Europe for his designs of gas engines.

G. A. Mayer has retired as treasurer of the Cincinnati Milling Machine Co. and his duties have been taken over by C. Wood Walter with the title of secretary-treasurer. Mr. Mayer retains his interest in the company and will continue to serve as director.

C. R. Darrow has left the employ of the Wm. B. Pollock Co., Youngstown, O., to accept a position with the Pennsylvania Engineering Works, New Castle, Pa., where as assistant general manager he will give particular attention to the sales department and to the management of the foundry and machine shop.

A. W. Selby, superintendent of the Covington, Ky., rolling mill of the Republic Iron & Steel Co. has tendered his resignation.

William. E. Burnham, formerly vice president of the Eaton, Cole & Burnham Co., Bridgeport, Conn., has been elected managing director of the Pacific Iron Works of that place.

OHIO ENGINEERS MEET.

The eleventh meeting of the Ohio Society of Mechanical, Electrical and Steam Engineers, which was also the annual meeting, was held at Canton, Ohio, on Nov. 17 and 18. All of the morning session Friday and part of the afternoon session were given up to the transaction of business; the afternoon session and part of the evening session to the reading of papers; the remainder of the evening session being devoted to business. On Saturday the members went by special trolley car to Salem, where they visited the works of the Buckeye Engine Co., and then returned to Alliance, where they visited the plant of the Morgan Engineering Co. Most of the members then returned to Canton and went their several ways.

The newly elected officers are: President, Prof. W. T. Magruder, of the Ohio State University; vice presidents, O. F. Rabbe, of Toledo, and H. E. Stone, of Cambridge, Mass.; managers, C. J. Miller, and Robert Hetzel, of Canton; secretary F. W. Ballard, of Cleveland; treasurer, W. D. Thebold, of Canton; assistant secretary, H. H. Kelley, of Atlanta, Ga.

Carnegie Foundation.—On Nov. 16, at Andrew Carnegie's residence in New York city all the trustees except President Harper of Chicago of the fund established as the "Carnegie Foundation" met for the first time. The meeting resulted in a thorough discussion and arrangement of plans and the election of directors and an executive committee, the chairman, vice-chairman and secretary of the directors board being President Eliot, President Harper and President Thwing, respectively. The executive committe of which President Pritchett of Massachusetts Institute of Technology is chairman, includes the presidents of Columbia, Princeton, Pennsylvania and Stevens Institute. Much of the work will devolve upon President Pritchett and it may be that he will resign from his connection with Massachusetts Institute of Technology. The annual meetings are to be held on the third Wednesday of November.

NEW STEEL CORPORATION RECORDS.

The United States Steel Corporation during October set new records in furnace products and in steel ingots. In the former class it turned out 950,752 tons against 900,777 in May, 1905, and in ingots added 94,636 tons to its production of last March, 1,078,315 tons. Among the 78 new records set by the Carnegie Steel Co., are the following: ingots, October 752,387 tons, March, 1905, 663,667; furnace products, October 588,258, March, 1905, 575,495. The Edgar Thomson Furnaces turned out 143,386 tons of iron, an increase of 8,539 over August last; the Clairton furnaces produced 39,600 tons and the Donora furnaces 26,329, both slight increases over the previous record. The converting department of the Edgar Thomson plants turned out 102,740 tons, breaking the record set in Oct., 1903, by 14,671 tons; the Duquesne works in the converting department added 644 tons to production of March, 1905, 60,000 tons; the open hearth department of the Clairton Steel works produced 49,257 tons, an increase of 6,521 over Sept. 1905; the open hearth department of the Donora works turned out 41,455 tons, an increase of 4,935 over Aug., 1905; the converting department of the Ohio steel works produced 71,917 tons, a gain of 5,539 over Oct. 1902; the converting department of the New Castle steel works made 60,022 tons, a gain of 2,456 tons over last September. The Pencoyd and Ambridge plants of the American Bridge Co. recorded good increases over previous records, and the American Sheet and Tin Plate Co. turned out 10,839 tons of standard black sheets against 10,400, the record made last March. These are but a few of the new records established during the busy month of October.

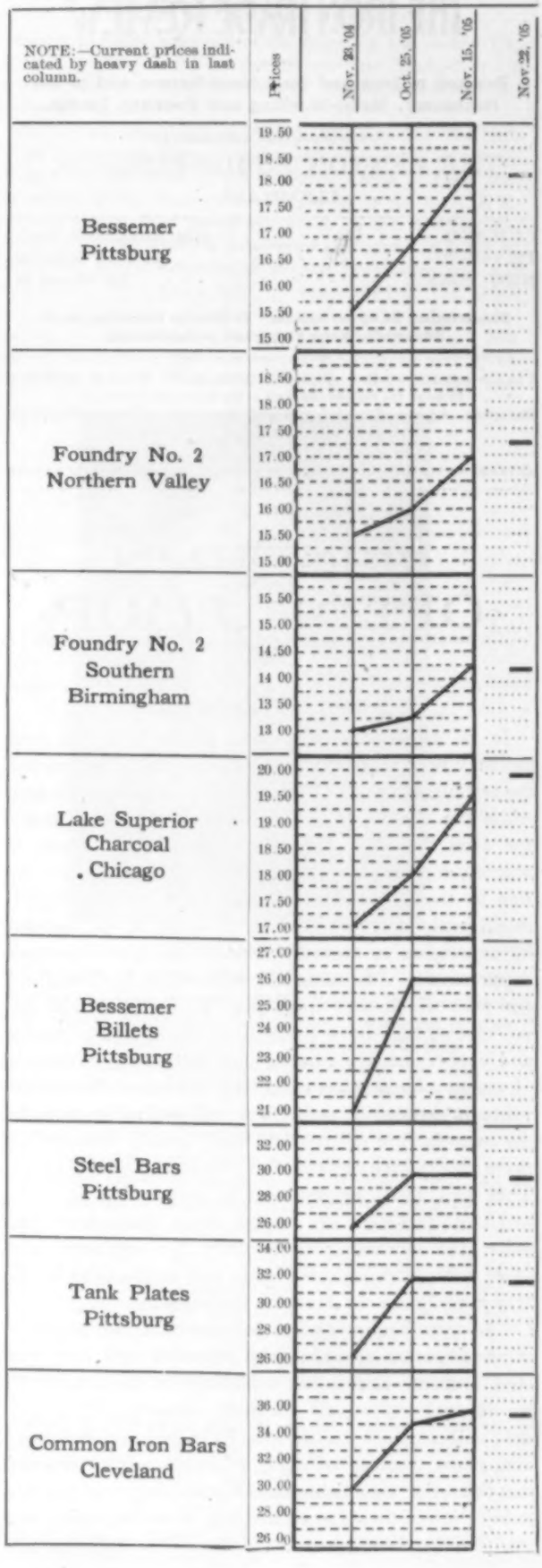
Fighting for the Open Shop.

An interesting labor question is to be settled at Milwaukee where T. J. Neacy, general manager and secretary of the Filer & Stowell Co., has retained counsel to fight the proposition of placing the union label on all printed matter of the board of education of which he is a member. Mr. Neacy some time ago was successful, by means of an injunction suit, in preventing the city of Milwaukee from awarding the contract for a large pump on specifications providing that it should be built only "by union labor working eight hours a day," when his own company, operating as an open shop, submitted a much lower bid. Mr. Neacy was also instrumental in aiding an "open shop" tailoring firm in dissolving an injunction secured by the tailors' union which forbade the employment of any but union employes. He is not opposed to labor unions, but only insists on a square deal for all alike.

A contract has been closed between the Pittsburg Coal Co. and the Republic Iron & Steel Co., whereby for the next six years the fuel supply for all the Republic plants is to be furnished by the former company. About 1,000,000 tons will be required annually, it is estimated, in case contemplated extensions of the Republic are made. The price is arranged on a sliding scale with the cost of mining as the basis.

Standard Roller Bearing Co., Philadelphia, Pa., are disseminating information in the form of a catalog regarding ball and roller bearings. This catalog contains about 90 pages and describes and illustrates journal roller bearings, agricultural roller bearings, roller motor bearings, tapered roller thrust bearings, grant conical roller bearings, tool steel balls, grooved ball thrusts, etc. The catalog also contains tables of price lists, together with a treatise on the use of roller bearings.

PRICE CHART.



THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades.

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A NEW DEPARTMENT.

In no direction has progress in the iron and steel industry been more marked than in its attitude toward the technical expert. Time was, not many decades ago, when the chemist was almost an unheard of luxury for even the most pretentious plant. Now there is scarcely a steel plant, blast furnace or foundry of any size in the country which has not a well-equipped, intelligently operated laboratory which it has learned by experience to regard as one of its most important departments. The technical universities have realized the part which they must play in our industrial development, they have studied conditions and problems and every year are turning out increasing thousands of young men who are rendering service of the highest value in improving processes and reducing costs in the manufacture of iron and steel, and in introducing more progressive methods in countless allied industries. They find ready employment in responsible positions and manufacturers are relying upon them more and more, the increasing opportunity for engineers and other college-trained men being well emphasized in the article of Professor Kent in this issue.

The Iron Trade Review believes that our technical universities are so intimately related to the iron and steel industry that it has established a department to be devoted exclusively to their interests. This will deal with news of the schools, including new buildings and plans, reports of their research work, personal mention, the establishment of new departments, the publication of theses presented and in fact anything and everything relating to the welfare of the technical institution. To all directly or indirectly connected with such institutions a cordial invitation to make this department of the greatest possible service in promoting the cause of technical education and in applying it to practical affairs of iron and steel industries is extended.

THE TRAINING OF FOUNDRY APPRENTICES.

The virtual appropriation of $3,000 a year for four years by the National Founders' Association for the support of a trades school of a new type marks a determination on the part of the leaders in the foundry trade to remedy a condition which is rapidly becoming disgraceful. As pointed out by several speakers on the floor of the convention held last week in New York, systematic training of boys to become competent molders, as understood a generation ago, has under present conditions of intensive production and organized labor become practically impossible. In the foundry of today there is neither time nor opportunity to instruct apprentices in all branches of the work. If the training is obtained at all it must be gained by a process of absorption. Journeymen molders will not bother with beginners and proprietors are too far removed from actual operations on the floor to give the matter attention. The labor unions have, moreover, so far restricted the number of apprentices which may be employed that, as one member at the convention observed, it requires under the union system forty years for a molder to reproduce himself.

As Mr. W. H. Pfahler said. "New conditions require new methods," and the delegation of the admitted duty of instruction to an institution especially equipped for that purpose is in strict accordance with the tendency of these progressive times. The institution selected for the experiment—for the project has not yet advanced beyond the experimental stage—is in many respects a departure from the ordinary schools of the past and present. The education of the hand is to be pursued for its own sake, or rather for the sake of manual proficiency as measured by a dollars and cents standard, and not as an adjunct of the machinery of mental culture which is the real objective of the usual manual training schools. It is another step in the transition from the theoretical to the practical in education, and the result of the new departure will be watched with great interest. If it is found to be possible to make efficient foundry foremen in a year or two at school, why not workmen of skill in any line of industry?

A. E. Hoermann, mechanical engineer, who has been with Curtis & Co., Mfg. Co., of St. Louis for several years as chief engineer, intends to leave this firm on Dec. 1 to open an office at 261 Broadway, Rooms 14-15, New York city as manufacturers' agent, and will make pneumatic machinery his specialty. He will represent Curtis & Co. Mfg. Co. as well as the Dayton Pneumatic Tool Co., Dayton, O., manufacturer of the Green hammer, and F. F. Slocomb & Co., Wilmington, Del., manufacturers of the Caskey hydro-pneumatic punch and riveter.

BLAST FURNACE CAPACITY.

The Bulletin of the American Iron and Steel Association for December 1 will publish the following valuable information concerning the capacity of the blast furnaces of the United States.

The annual capacity of all the blast furnaces in the United States which were active on June 1, 1904, or which were likely to be some day active, as published in our directory in August, 1904, amounted to 28,114,000 gross tons of pig iron. Included in these figures were 8 completed furnaces, with an annual capacity of 1,155,000 tons, which had not made pig iron down to the date named but have since been blown in. Also some furnaces which would never run again but whose fate could not then be determined.

Since June 1, 1904, 15 furnaces, with a total annual capacity of 1,982,000 tons, have been completed and blown in, and 15 furnaces, with a total annual capacity of 461,000 tons, have been abandoned or dismantled. In addition 16 furnaces, with a total annual capacity of 1,830,000, were in course of erection on November 1, 1905.

During the period between June 1, 1904, and November, 1905, a number of furnaces which were classified as active on the former date have been equipped with additional blowing machinery or have been rebuilt or reconstructed, thus increasing their annual capacity, as we estimate it, at least 500,000 tons. On the other hand, a number of furnaces which were included in the active list on June 1, 1904, have since been idle and are likely to long remain idle, while others that have been idle since that date will soon resume operations. We estimate the annual capacity of these idle furnaces at approximately 1,500,000 tons. Summarizing the foregoing details we reach the following results:

Furnaces—Gross tons.	Annual capacity.
Completed furnaces on June 1, 1904.....	28,114,000
Completed and blown in since June 1, 1904....	1,982,000
Total	30,096,000
Abandoned or dismantled since June 1, 1904....	461,000
Total	29,635,000
Rebuilt and enlarged since June 1, 1904.....	500,000
Total	30,135,000
Furnaces idle since June 1, 1904.....	1,500,000
Approximate annual capacity in Nov., 1905....	28,635,000

The 16 furnaces which were in course of erection on November 1, 1905, will have a total annual capacity of 1,830,000 tons. Of these furnaces 3 stacks, with an annual capacity of 315,000 tons, will probably be ready for blast in January, 1906; 2 stacks, with an annual capacity of 240,000 tons, will be ready in February; 2 stacks, with an annual capacity of 215,000 tons, will be ready in March; 1 stack, with an annual capacity of 145,000 tons, will be ready in April; 3 stacks, with an annual capacity of 450,000 tons, will be ready in June; and 5 stacks, with an annual capacity of 465,000 tons will be ready in the summer or fall of 1906.

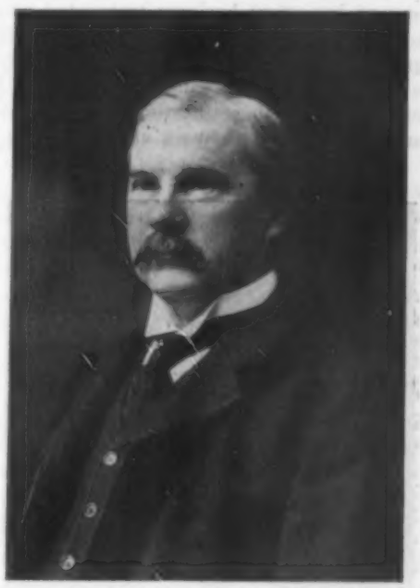
As the production of pig iron in this country in October was at the rate of almost 25,000,000 tons annually it will be seen that, if the capacity of the furnaces which have been idle since June 1, 1904, be omitted, over 87 percent of the available furnace capacity of the country on November 1 was then in operation.

During November several furnaces which have been idle since June, 1904, have resumed operations and repairs are now being made to a number of furnaces long idle which are expected to be ready for blast in December, January, and February. If to the capacity of these furnaces we add the capacity of the building furnaces which are to be ready for blast in January and February, 1906, it will be found that within the next 90 days furnaces with an annual capacity of about 1,000,000 tons will probably be running.

DEATH OF ALBERT J. PITKIN.

Albert J. Pitkin, president of the American Locomotive Co., died at his home on Riverside Drive, New York, Nov. 16 after an absence from his office of several months on account of illness.

Mr. Pitkin was born in Akron, O., attended the high school there and learned the machinists' trade as an apprentice in the shops of the Webster, Camp & Lane Machine Co. For a time he was employed in the C. A. & C. railway shops, then spent five years in the drafting department of the Baldwin Locomotive Works and went to the Rhode Island Locomotive Works, Providence, as chief draftsman. Two years later he was called to the Schenectady Locomotive Works as mechanical engineer, becoming in turn superintendent, and vice president and general manager. This last-named position he was given on the formation of the American Locomotive Co, and



ALBERT J. PITKIN.

on the death, in June, 1904, of Samuel R. Calloway he succeeded to the vacant presidency. He was also president of the Atlantic Equipment Co., of the Locomotive & Machine Co., of Montreal, of the Locomotive Security Co., and of the Richmond Locomotive Works and chairman of the board of directors of the Roger Locomotive Works. He was an active member of the Civic Federation and a generous philanthropist and church worker.

Mr. Pitkin was twice married. He is survived by a widow, a son and three daughters. S. H. Pitkin, first vice president of the Wellman-Seaver-Morgan Co., and W. C. Pitkin of Akron, O., are brothers.

Professor John L. Morris of Cornell University died at Ithaca Nov. 19 from a complication of a paralytic stroke and pneumonia. He was 73 years of age. Until he retired last year Professor Morris was at the head of the mechanical arts department of Sibley College, having been the choice for that position of Hiram Sibley, founder of the institution.

Richard W. Kniseley, member of the firm of Kniseley Brothers, metal manufacturers of Chicago, died Nov. 15 at Colorado Springs where he had gone in an attempt to regain his health which was broken by an attack of typhoid fever last July. He was 37 years of age.

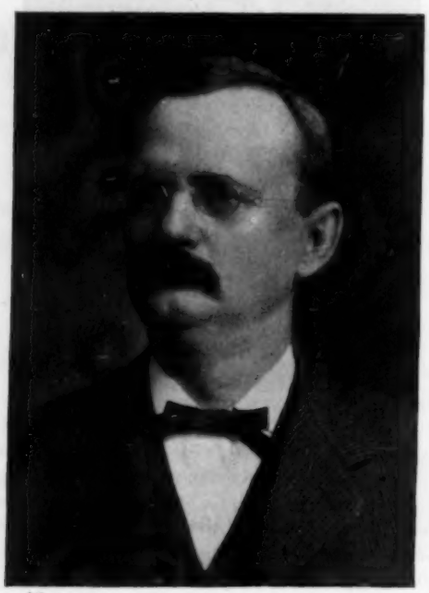
Samuel Wallace, White Haven, Pa., a pioneer foundryman, died October 31, at the age of 77. He was the owner of the White Haven Iron Works.

NATIONAL FOUNDERS' ASSOCIATION.

RECORD ATTENDANCE AND PERFECTLY HARMONIOUS SESSIONS.

Government Aid for the Merchant Marine Indorsed—Will Support Winona School for Molders and Foundry Foremen —New Policy Approved.

Considered from all possible points of view the 1905 meeting of the National Founders' Association in New York last week was the most successful in the history of the organization. Not only were a record number of members present but the perfect unanimity of the representatives from widely separated sections of the country and the amount of important business transacted without the slightest hint of friction all promise success for the efforts of this peace-making and peace preserving body far beyond the hopes of the most sanguine among its founders. The chief business of these meetings is the consideration and discussion of the year's work and the laying of plans for the next season's campaign. The efforts in the interest of peace between founders and their employees during the past 12 months have succeeded in a very gratifying manner. No doubt conditions which were unusually favorable contributed largely to this result. Pres. Pessano stated that at no time in the history of the foundry business had prosperity been so widespread or the labor situation been more peaceful. But the industrial situation alone could not account for the remarkable results achieved during the past year. Better organization and methods and an experienced staff of officers all helped to obtain the splendid success.



PRESIDENT O. P. BRIGGS.

Probably the most significant of the resolutions passed at the New York meeting were those concerning the support of a school for the training of molders and foundry foremen and the endorsement of the movement for obtaining government aid for putting the American shipping industry upon a decent and solid basis. The decision to aid the Winona school is of especial significance to the unions which have constantly endeavored to limit the output of competent molders as well as to restrict the production of the molders already on the floor. The intervention in behalf of our merchant marine which was a remarkable feature of the only strictly social session of the convention adds another to the demands for legislative action which the business organizations of the country have been piling up for the consideration of those who make our laws.

Wednesday Morning.

The theme of the opening session of the convention was the success of the association's new policy inaugurated a year ago in Cincinnati when the New York agreement was abrogated. The address of President Antonio C. Pessano, the report of Commissioner Briggs and other officers of the association all testified to the influence of that policy in the various conditions which prevailed in what is admitted to have been the most successful year in the history of the organization. Reports of the progress in applying the principles to the situation in Philadelphia where eleven members were experiencing trouble aroused the greatest enthusiasm and led to the immediate despatch of a telegram offering encouragement and support to the members affected.

VICE-PRESIDENT HENRY A. CARPENTER.

The address of President Pessano and report of Commissioner Briggs will be found on pages 33 and 34 of this issue.

W. D. Sayle, of Cleveland, read the treasurer's report. It showed that the assocation was in a very healthy financial condition. The whole is ably summarized in the address of President Pessano. The report of Secretary F. W. Hutchings is also covered in the general view of the

work and the conditions of the association given by the president.

The Philadelphia Strike.

Ex-President I. W. Frank described the conditions at Philadelphia and the causes which led to the strike now in progress there. He said the difficulty between the founders and their employes was not a question of wages but of principle—the principle of direct contract between employer and employe. A report of a committee on the situation was read besides several letters from members and officers of the association and the assembly was urged to take immediate action in the matter. After an enthusiastic discussion in which the president and a number of members took part and which was plentifully punctuated with cheers and applause the following resolution was adopted with instructions to transmit it to Philadelphia to those most interested without delay:

Resolved, That this association in convention assembled recognizes in the Philadelphia strike of molders and coremakers a deliberate attempt on the part of the Iron Molders' Union of North America to force upon our members contracts contrary to the spirit of our approved policy and contrary to the Constitution of the United States and the civil right of our members in preventing the exercise of the right of individual contract between employer and employes, and be it further

Resolved, That the support given by our officers is fully indorsed and that the incoming officers and council are hereby authorized and directed to use all the moneys, ways and means at our command and to further assess our members to the extent necessary to establish the principle which is so grossly assaulted.

Wednesday Afternoon.

The second session was devoted to discussions by members upon the floor of the best methods to be adopted to keep the activities of the more radical among the labor unions from flagrant violation of the law and to bring professional sluggers and other law-breakers to justice, the advisability of extending the scope of the organization, how to secure the best results with molding machines and other topics of absorbing interest. Quite logically one subject was found to merge into the other so that at no time during the afternoon were the prime objects of the association lost to view.

The vigorous and systematic prosecution of violators of the law was discussed and commended by a number of speakers, among them J. A. Stone, of Cleveland, J. H. Webster and F. T. Town. T. E. Durbin, of Erie, Pa., urged the association to take measures looking to the securing of more specific legislation difficult to evade or misinterpret, and along this line F. T. Giblin, Utica, N. Y., proposed the establishment of a legal bureau as a department of the organization's office force. The broadening of the association's working field so as to secure additional protection to its members was brought up by H. N. Covell, of Brooklyn, and after an extensive discussion was referred to the administrative council for consideration.

Machine Molding.

A. J. Caldwell, of New York, introduced the subject of machine molding and the method of securing the best results. He drew a distinction between molding by machine and machine molding. Machine molding, proper, he defined as any method which takes any one or all of the operations out of the hands of the operative and places it upon a mechanical basis. The precise method to be employed must be determined by the class of work in hand. The chief factor was one of expense—"Does it pay?" But there were many other considerations besides those of dollars and cents. One of these is the question of output. He gave an instance in which the output of the foundry had been increased 40 percent by the introduction of machines. Other considerations were the speed in which work could be got out of the way, the saving of material, and the reduction of time necessary for the passage of material through the shop, thus effecting a saving in capital locked up in stock.

But the advantage of the machine method upon which Mr. Caldwell placed the most emphasis was that of the better control which it gave the proprietor over his men. It renders the force more flexible, he declared.

Other advantages of this method of procuring castings, mentioned by the speaker, were the reduced cost of cores and less wear and tear on patterns. A rough estimate as to the saving in the matter of patterns had shown results in favor of the machine at least four or five times as favorable as those of the ordinary method.

The value of the machine in time of trouble was discussed be John E. Jones, of Utica, N. Y., W. L. Prince and S. B. Peck, of Chicago. Mr. Prince expressed the view that the control of labor was essential to the effective use of the machine, and that the greatest advantage could be obtained only when the pattern was put in rightly, when everything was adjusted properly and when the man formed a part of the machine.

W. H. Pfahler, of Philadelphia, discussed a plan which had been under consideration for some time with a view to bringing about a closer affiliation between the National Founders' Association and the Metal Trades Association. He pointed out the similarity of the purposes of the two organizations and the saving in expenses which might be effected along the lines suggested in the plan submitted by the council. A resolution to submit the matter to the association by letter ballot was finally carried after considerable adverse discussion. Some of the speakers agreed only after it had been explained that the plan if adopted would bring about absolutely no harmful change in either association except possibly a handsome reduction in the expense account, and on the other hand, gave prospect of ultimately being an exceedingly advantageous proposition in many ways.

The Banquet.

The banquet, held on Wednesday evening, was the only formally social event of the meeting, and it was around the tables that the members renewed old associations, sang songs, joked at one another's expense and indulged in the sort of good time that a busy man likes to have when away from his desk. Incidentally, the assembly placed itself on record as heartily in favor of Government action to restore the American merchant marine to the position which all industries agree that it should occupy.

Toastmaster Walter S. Russell looked upon about a hundred guests, whom he, with the assistance of the speakers of the evening, was expected to amuse and entertain. President Pessano was the shining mark toward whom much good natured pleasantry was directed, T. E. Durban especially excelling in extolling the surpassing virtues of the chief executive officer. John M. Taylor also suffered greatly at the hands of the jokers.

The orator of the banquet was Dr. J. Leonard Levy, pastor of the Reformed Hebrew Church at Pittsburg. He won the hearts of his hearers at once by means of an Irish witticism at his own expense and the equivocal statement that "In Pittsburg we make iron and steel for a living." The theme of his address was an appeal for higher ideals. The rule of right and not that of might should be our aim. Even in this age of graft, "Men are measured by the square deal which they give to others," he said. "There are crying wrongs in America which demand justice and no achievement of civilization can be permanent unless it is founded upon righteousness."

The speaker referred to the shipping industry of the United States and declared that "Japan will be in the

Orient what England is in the Western world." "American shipping," he said, "needed an application of the tariff principle" and he urged the association to bring the question to the attention of Congress. In conclusion he said that the real "'Yellow Peril' is not the peril of Japan but the danger of the prevailing lust for gold."

F. B. Farnsworth, of New Haven, Conn., declared he favored unions except those "of the gas pipe variety." J. Hampton Moore, first chief of the U. S. Bureau of Manufacturers, spoke of governmental neglect of the industries of the country, referring to the bureau's pittance of $11,000 a year, and urged the necessity of building up a fleet of merchant ships for developing the foreign commerce which our industries need and demand. President S. C. Dickey, of the Winona Trade Schools, made an appeal for the coming men, the 2,000,000 boys who never reach the eighth grade in the public schools.

Stimulated by the eloquence of Dr. Levy, the banqueters resolved themselves into a business meeting and unanimously adopted the following resolution presented by one of the members in such a speech reviewing the important arguments for such a course:

"Resolved, that this convention of the National Founder Association does most earnestly urged that our national legislators give their early attention to the deplorable condition of the American merchant marine.

"Resolved, that we urge the immediate passage of the merchant marine bill proposed by the merchant marine commission and submitted to the last Congress as a part of its report."

Thursday Morning.

J. A. Rathone of Utica, N. Y., continuing the discussion of the training of apprentices, suggested that the question had been neglected on all sides. Matters had now come to a pass where something had to be done. He called upon the proprietors of union shops to use every effort to train more boys, adding that it was unfair to expect the open shops to make all the molders.

John Knickerbocker, of Chicago, said that the trade needed better material and to secure better material it might be necessary to offer more attractive inducements. A higher wage would attract more desirable youngsters and the same policy would prove a constant stimulus to the budding molder. He spoke of the experience of his firm in training competent men and the use of literature in the instruction of the molder. It had not been a simple matter to secure suitable printed material. After much thought and study the pages of *The Foundry* had been found to be the most suitable for the purpose, and the firm had, therefore, placed this publication in the hands of its young men.

A member from the Bay State caused a general smile by declaring that an educated molder would never be worth a big continental D—.

V. M. Moore thought that the only solution of the apprentice question like that of so many other questions lay in the open shop.

John Magee, of Boston, called attention to a bit of human nature which led apprentices to leave the shop immediately upon graduation for fields where familiarity had not bred contempt and more consideration would be accorded them. Every shop, he said, is educating apprentices for other shops.

Several members took issue with Mr. Magee on the plea that proprietors should not consider the question from a selfish standpoint merely, that aside from the duty to the boys something should be done for the trade at large.

Thursday Afternoon.

As all the regular and miscellaneous business had been disposed of at the morning session the last session was devoted to the pleasant duty of electing officers for the ensuing year, installations, the presentation of resolutions of appreciation, listening to addresses, etc.

F. T. Towne, of the nominating committee announced the nominations which he and his associates, I. W. Frank and W. D. Sargent, had decided upon during the day. The name of O. P. Briggs as nominee for president was greeted with prolonged cheers as in fact were all the others. The committee had evidently chosen exceptionally popular names. Mr. Briggs was duly elected by the deposit of a unanimous ballot and he accepted the office with a graceful tribute to his predecessor and to those who had so signally shown their confidence. Mr. Bermingham and Mr. Pfahler escorted the newly elected executive officer to the chair.

Henry A. Carpenter, of Providence, R. I., was chosen vice president. He also accepted office amid cheers and congratulations.

Secretary F. W. Hutchings was also re-elected to the position of secretary.

The State Savings Bank, of Detroit, was relected to the office of treasurer.

A resolution recommending to the administration council the choice of A. J. Caldwell, of New York, to the office of commissioner made vacant by the resignation of President-elect Briggs was passed unanimously.

A. E. McClintock was recommended for the post of assistant commissioner which he had filled for the year.

The choice of W. H. Pfahler as honorary member of the administrative board elicited more cheers and congratulations.

District Committeemen.

The election of officers in the convention was completed by the choice of the following district committeemen, the first name each district being that of the chairman of that district:

First District.—F. B. Farnsworth, McLagon Foundry Co., New Haven, Conn.; A. W. Whitcomb, Whitcomb-Blaisdell Machine Tool Co., Worcester, Mass.; F. H Brown, Davis & Farnum Mfg. Co., Waltham, Mass.; A. N. Abbe, P. & F. Corbin, New Britain, Conn.; J. D. Hunter, James Hunter Machine Co., North Adams, Mass.

Second District.—R. C. Oliphant, Trenton Malleable Iron Co., Trenton, N. J.; H. W. Wendt, Buffalo Forge Co., Buffalo, N. Y.; F. E. Wheeler, International Heater Co., Utica, N. Y.; Arthur E. Barlow, Newark, N. J.: Gilbert H. Johnson, Isaac G. Johnson & Co., Spuyten Duyvil, N. Y.

Third District.—Stanley G. Flagg Jr., Stanley G. Flagg & Co., Philadelphia, Pa.; Thos. F. Durban, Erie City Iron Works, Erie, Pa.; John E. Harbester, Reading Hardware Co., Reading, Pa.; Stuart R. Carr, Stuart R. Carr & Co., Baltimore, Md.; Geo. Mesta, Mesta Machine Co., Pittsurg, Pa.

Fourth District.—William Gilbert, Buckeye Foundry Co., Cincinnati, O.; Irving H. Reynolds, William Tod Co., Youngstown, O.; H. J. Boggis, Taylor & Boggis Foundry Co., Cleveland, O.; W. H. Morgan, Morgan Engineering Co., Alliance, O.; C. B. Calder, Detroit Ship Building Co., Dtroit, Mich.

Fifth District.—Ward W. Willits, Adams & Westlake Co., Chicago, Ill.; Geo. Q. Thornton, Carondelet Foundry Co., St. Louis, Mo.; Chas. A. Barnard, Barnard & Leas Mfg. Co., Moline, Ill.; J. W. Gardner, Gardner Governor Co., Quincy, Ill.; T. R. Kackley, Atlas Engine Works, Indianapolis, Ind.

Sixth District.—O. B. Kinnard, Kinnard-Haines Co., Minneapolis, Minn.; H. M. Wallis, J. I. Case Plow Works, Racine, Wis.; Geo. C. Forgeot, Allis-Chalmers Co., Mil-

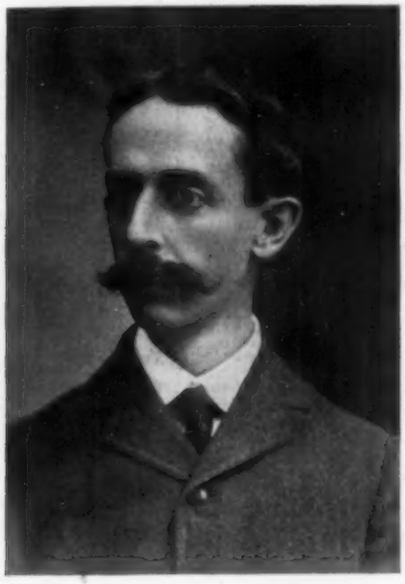
waukee, Wis.; Geo. H. Smith, Geo. H. Smith Steel Castings Co., Milwaukee, Wis.; A. I. Brawley, South Park Foundry & Machine Co, St. Paul, Minn.

Seventh District.—Geo. W. Watts, Canada Foundry Co., Ltd., Toronto, Ont.; H. Cockshutt, Cockshutt Plow Co., Ltd., Brantford, Ont.; R. J. Whyte, The Frost & Wood Co., Ltd., Smith's Falls, Ont.; Chas. H. Carrier, Carrier, Laine & Co., Levis, Quebec; K. W. Blackwell, Montreal Steel Works, Ltd., Montreal, Quebec.

Eighth District.—E. Burkitt, Birmingham Machine & Foundry Co., Birmingham, Ala.; T. J. Watson, Caldwell-Watson Foundry & Machine Co., Birmingham, Ala.; J. D. Dimmick, Dimmick Pipe Co., Birmingham, Ala.; A. D. Schofield, J. S. Schofield's Sons Co., Macon, Ga.; Sam D. Jones, Atlanta Stove Works, Atlanta, Ga.

Preliminary Meetings.

The administrative council of the association held several executive sessions before the opening of the convention proper, most of the members having been registered at the Hotel Astor as early as Monday of the week. Several important matters to be brought before the meeting were considered and the work of the week carefully planned. One of the subjects which aroused most discussion was the report of the committee appointed some months ago to confer with a similar committee of the National Metal Trades Association looking toward a closer union or co-operation between the two associations. The report of the joint committee which had already been placed before the council of the National Metal Trades Association at Cincinnati in October, was submitted to the administrative council of the National Founders' Association at the first meeting of the body on Monday.



COMMISSIONER A. J. CALDWELL.

The following were the members of the joint committee which formulated plans later laid before the association. For the National Founders' Association, Wm. H. Pfahler, Abram Cox Stove Co., Philadelphia; John L. Ketcham, Brown-Ketcham Iron Works, Indianapolis: James McNaughton, American Locomotive Company, Schenectady; for the National Metal Trades Association: F. A. Geier, Cincinnati Milling Machine Company, Cincinnati; F. K. Copeland, Sullivan Machinery Company, Chicago; M. H. Barker, American Tool Works Company, Boston.

The "Alumni" banquet, which according to a custom which has almost become a law was held the night preceding the opening session, was attended by forty-two officers, ex-officers, members, and ex-members of the administrative council. Besides much informal conversation, the topics covered by the program came in for general discussion. Past President I. W. Frank presided and among the speakers were the following: William H. Pfahler, Antonio C. Pessano, O. P. Letchworth, Stanley G. Flagg, T. J. Drummond, W. D. Sayle, F. T. Towne, E. McDougall and C. Bermingham.

The New Commissioner.

A. J. Caldwell, the new commissioner, brings to that office an experience of many years. He was for a long time associated with the H. R. Worthington Pump Co., which he left to assume a responsible position with the Crane Co., Chicago. When Crane interests purchased the Eaton, Cole & Burnham Co. at Bridgeport, Conn., he went there as a representative of the new interest and remained until recently.

Receivership for Brown-Corliss Engine Co.—The Brown-Corliss Engine Co., Corliss, Wis., is in the hands of a receiver. Reorganization of the company to prevent bankruptcy proceedings was attempted some time ago but failed, and the Wisconsin Loan & Building Association finally foreclosed mortgages given by W. S. Whiting, its president, and the Corliss Improvement Co., as security for claims aggregating $3,000. The Brown-Corliss Engine Co. was incorporated May 4, 1901 with a capital stock of $1,000,000. It purchased large tracts of farming land and erected machine shops and foundries for the manufacture of stationary engines. Efforts to sell the land were not entirely successful and the company became involved in financial difficulties although it received many large contracts. A year ago it issued $150,000, 20-year five per cent gold bonds. Liabilities and assets are roughly estimated at $600,000 each. The Fidelity Trust Co., of Milwaukee, has been formally appointed as receiver and involutary bankrupcy proceedings have been started against the company. Efforts are already being made to reorganize the forces of the company with the probability of success. The factory is being run as usual and contracts will be filled as though no embarrassment had occurred.

Latrobe Plant is Acquired.—The Railway Steel Spring Co. makes the announcement that it has acquired by purchase the Latrobe Steel Co., Latrobe, Pa., which manufactures principally steel tires for car and locomotive wheels. It is capitalized at $1,500,000. Its president, Mariott C. Smythe is in practical control of the Latrobe Steel & Coupler Co. of Philadelphia, a $300,000 corporation. This acquisition will still further strengthen the position of the Railway Steel Spring Co. in the railway spring field. The purchase, it is understood, will be financed by an issue of $4,500,000 5 percent bonds of the Railway Steel Spring Co., which will be a first mortgage on the property of the steel company.

Dominion Company Breaks Records.

Graham Fraser and J. Dix Fraser, director of works and assistant director of works respectively of the Dominion Coal & Iron Co., Sydney, C. B. gave a dinner to a number of their business associates Nov. 9, preliminary to their leaving the company. During the course of an address, Graham Fraser called attention to three new records set by the Dominion company in October. The open hearth output was 18,915 tons, an increase of 3,837 over June, 1903, which had held the record, the blooming mill turned out 15,262 tons, 1,246 more than in Oct. 1902, and the blast furnaces added 565 tons to the 8,124 of June, 1902, which was the largest preceding output.

ACTIVITY FOLLOWS HIGH MONEY RATES.

STOCK MARKET WEATHERS FINANCIAL STORM WITHOUT NEED OF FEDERAL AID.

Securities Are Active With Dealing Heavy And Healthy.—Difficulties Probably Past.

A week of strong, healthy activity in securities followed the quick recovery of the market from the trying conditions of Monday when call money went to 25 per cent, the highest mark in three years, and of Tuesday when it was but a few points lower. The severe test imposed upon the market by the combination of abnormal money rates and the heavy deficit in New York bank reserves was met remarkably well, and by the middle of the week securities had regained their usual prices and were heavily dealt in. The high interest rates brought out great amounts of money from Canada and the interior and the situation was strengthened by the belief that the bulk of stocks were in strong hands, so that the storm was weathered without the governmental aid which would have been forthcoming had it become apparent that any except the daring speculators were in danger. The close of the week found securities more active than for some time past; Thursday's sales on the New York exchange were over 1,200,000 shares and Friday passed the million mark. Advances were recorded in almost every important stock, the leading iron, steel and railway equipment stocks generally recording enough of a gain to indicate a healthy tone without the suggestion of manipulation. Tennessee Coal & Iron and Sloss-Sheffield advanced sharply, partly on the rumors of a consolidation of interests in the Southern field and partly on the continuance of prosperity reports in the industry. Railway Steel Springs on Tuesday reached the highest mark in its history. The market opened strong the current week and the feeling prevails that the recent difficulties marked the climax of the speculative movement and that henceforth improvement may reasonably be looked for.

Dividend declarations of the past week include the following: Mexican Coal & Coke Co., regular semi-annual, 3 percent, payable Dec. 5; Railway Steel Springs Co., regular quarterly, 1¾ percent on preferred stock, payable Dec. 20; Barney & Smith, regular quarterly, 2 percent on preferred stock, payable Dec. 1; Fay & Egan, regular quarterly, 1¾ percent on preferred and 1¼ percent on common stock, payable Nov. 20.

The Youngstown Foundry & Machine Co., Youngstown, O., among other large contracts is to furnish much of the material for the construction of the plants of the Youngstown Sheet & Tube Co. and the Republic Iron & Steel Co., at Haselton, Pa.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quotation Nov. 11.	Closing Quo. Nov. 18	Changes	Date of 1905 Ann. Meet.	Par Value	Capital Outstanding	Dividend		
							Basis	Being Paid	Date Last Div. Dec.
Allis-Chalmers Co	19	20⅜	+1⅜	Sept.	100	19,820,000			
Allis-Chalmers preferred	61¼	62⅝	+ ⅜		100	16,150,000	7 cum		Feb., 1904
American Can	9¾	9½	− ¼	Feb.	100	41,233,300			
American Can preferred	70	70⅝	+ ½		100	41,233,300	7 cum	5 Q.	Oct., 1905
American Car and Foundry	39	40¾	+1¾	June 29	100	30,000,000			May, 1905
American Car and Foundry preferred	100	100¾	+ ¼		100	30,000,000	7 n. c.	7 Q.	Oct., 1904
American Locomotive	66¼	67¾	+1½	Oct. 17	100	25,000,000			
American Locomotive preferred	114½	114	− ½		100	24,100,000	7 cum	7 Q.	Oct., 1905
American Shipbuilding	55½	55	− ½	Oct. 4	100	7,000,000	4	4 Q.	Dec., 1905
American Shipbuilding preferred	105	105	.....		100	7,900,000	7 n. c.	7 Q.	Oct., 1905
American Steel Foundries	12¾	12½	− ¼	Oct. 3	100	17,700,000			
American Steel Foundries preferred	45	46¼	+1¼		100	17,700,000	6 cum		Aug., 1904
Barney & Smith	18	18	.....	June 6	100	1,000,000			June, 1893
Barney & Smith preferred	125	125	.....		100	2,500,000	8 cum	8 Q.	Dec., 1905
Bethlehem Steel	29	30	+1	April 4	100	15,000,000			
Bethlehem Steel preferred	84	85	+1		100	15,000,000	7 n. c.	7 Q.	Nov., 1905
Bullock Electric preferred	114	114	.....	Oct. 1	100	1,000,000	6	6 Q.	Oct., 1905
Cambria Steel	28	27⅞	− ⅛	March 21	50	45,000,000	6	3 S. A.	Aug., 1905
Cambria Iron	49¼	49¼	.....		50	8,468,000	4	4 S. A.	Oct., 1905
Colorado Fuel & Iron	43½	45	+1½	Oct. 16	100	30,132,000	7	.....	Apr., 1902
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	28	28	.....	May 25	100	6,068,000	5	.....	Nov., 1902
Crucible Steel	13	12¾	− ¼	Oct. 18	100	25,000,000		.....	
Crucible Steel preferred	67	66	−1		100	25,000,000	7 cum	.....	Sept., 1903
Empire Steel	7¼	7	− ¼	Feb. 22	100	2,281,400		.....	
Empire Steel preferred	38	38	.....		100	2,500,000	6 cum	3 S. A.	Jan., 1905
Fay & Egan	60	60	.....	Feb. 21	100	1,000,000	5	5 Q.	Nov., 1905
Fay & Egan preferred	118	122½	+4½		100	1,000,000	7 cum	7 Q.	Nov., 1905
General Electric	185	185½	+ ½	May 9	100	48,256,050	8	8 Q.	Oct., 1905
International Pump	38	40	+4	June 6	100	12,262,500		2	July, 1905
International Pump preferred	82	83	+1		100	8,850,000	6 cum	6 Q.	Nov., 1905
Lackawanna Steel	81	81	.....	March 8	100	34,971,400		.....	
Lake Superior Corporation	17	17⅛	+ ⅛		100	40,000,000		.....	
Niles-Bement-Pond	121	121	.....	Feb. 1	100	5,000,000	6	6 Q.	Sept., 1905
Niles-Bement-Pond preferred	103⅝	103⅝	.....		100	2,000,000	6 cum	6 Q.	Nov., 1905
Otis Elevator Co	61	62	+1	March 20	100	6,350,300		2 A.	Apr., 1905
Otis Elevator Co. preferred	107	109	+2		100	5,589,500	6 n. c.	6 Q.	Oct., 1905
Pittsburg Coal Co	15	13⅜	−1⅝	Feb. 11	100	30,135,000		.....	
Pittsburg Coal preferred	52½	52⅜	+ ⅜		100	30,716,200	7	.....	Apr., 1905
Pressed Steel Car	48¾	50⅜	+1⅝	Feb. 15	100	12,500,000	3		Aug., 1904
Pressed Steel Car preferred	97⅞	98¼	+ ⅜		100	12,500,000	7 n. c.	7 Q.	Nov., 1905
Pullman Palace Car	243	240	−3	Oct. 19	100	74,000,000	8	8 Q.	Nov., 1905
Railway Steel Spring	56⅞	59¼	+2⅜	March 2	100	13,500,000		4 S. A.	Oct., 1905
Railway Steel Spring preferred	103½	102	−1½		100	13,500,000	7 cum	7 Q.	Dec., 1905
Republic Iron & Steel	24¾	26¼	+1½	Oct. 18	100	27,352,000		.....	
Republic Iron & Steel preferred	94⅝	97⅝	+2⅞		100	20,852,000	7 cum	7 Q.	Oct., 1905
Sloss-Sheffield	74½	84¾	+9¾	March 15	100	7,500,000	5	5	Oct., 1905
Sloss Sheffield preferred	112½	112½	.....		100	6,700,000	7 n. c.	7 Q.	Oct., 1905
Tennessee Coal & Iron	94⅞	102¼	+7⅜	May	100	22,552,800		4 Q.	Nov., 1905
U. S. Cast Iron Pipe & Foundry	38⅛	38⅝	+ ⅝	June 28	100	12,500,000		1	Dec., 1905
U. S. Cast Iron Pipe & Foundry preferred	96⅜	92⅝	−3⅞		100	12,500,000	7 n. c.	7	Dec., 1905
U. S. Steel	36⅞	37¼	+ ⅜	April 17	100	508,302,500		.....	Dec., 1903
U. S. Steel preferred	101⅞	103	+1⅛		100	360,281,100	7 cum	7 Q.	Nov., 1905
U. S. Steel 5's	95⅞	96⅝	+ ¾		100	463,798,000	5	5 A.	
Virginia Iron, Coal & Coke	47	50⅜	+3⅜	Sept. 19	100	8,641,600		.....	
Westinghouse Electric	170	172	+2	June 28	50	20,996,350	10	10 Q.	Oct., 1905
Westinghouse Air Brake	149½	149½	.....	Oct. 3	50	10,990,450	20	20 Q.	Oct., 1905

The Great Deposit of Iron Ore at Parapara, New Zealand.

BY JAMES MACINTOSH BELL, DIRECTOR OF THE GEOLOGICAL SURVEY OF NEW ZEALAND.

New Zealand boasts of at least two deposits of iron ore, both of vast proportions. These differ widely in their mineralogical character and in their mode of occurrence. One which occurs along the western coast of the North Island at intervals from New Plymouth to the mouth of the Patea river, and even north and south of these two points, consists of immense banks of titaniferous iron sand, of variable thickness, sometimes divided by wide layers of quartz sand, but often remarkably free from foreign admixture. These sands have been derived from the decay of syenites and more basic eruptive rocks, containing a large proportion of titaniferous magnetite. The other and apparently much the more valuable deposit, is a huge mass of hydrous hematites situated at Parapara near the village of Collingwood, on the Cape Farewell peninsula on the north coast of the South Island.

Various attempts have already been made to work both deposits in a somewhat desultory manner, but up to the present the efforts to produce steel in New Zealand, from the native ores, have been unsuccessful. At present the economic value of the iron sands of the North Island, seems a debated question, owing to the various refractory characteristics of the ore. Not so, however, are the hematites and limonites of Parapara, which, if they existed in a country with superior conditions of labor, or less remote from important industrial centers than New Zealand, would be of tremendous value.

The Parapara iron ore is located on a range of low hills, which face the western side of Golden bay, and are bordered by a narrow coastal bench of remarkably even coast line, but in a few places indented by shallow, irregular inlets, into which the short rapid rivers debouch. Towards the south the hills, in which the ore is situated, increase in altitude and a roughly parallel range lying to the westward, in the same southward direction, rises to the dignity of mountains. These peaks, with their summits covered with snow during most of the year, are the source of the numerous mountain torrents which rush to Golden bay, or to the Tasman sea, on either side of the Cape Farewell peninsula.

VIEW OF HEMATITE ORE SHOWING SLUICING CLAIM ON EDGE OF ORE.

The rocks associated with the ore are all metamorphic and consist of a much folded and contorted series of hornblendic, and felspathic schists, sideritic limestones, and cherty quartzites. These have been tentatively called silurian, by S. Herbert Cox, formerly a geologist on the staff of the New Zealand Geological Survey.* Above the series in which the ore occurs, lies a considerable thickness of coal-bearing rocks, limestones, sandstones, grits, and coal seams, classified by various writers

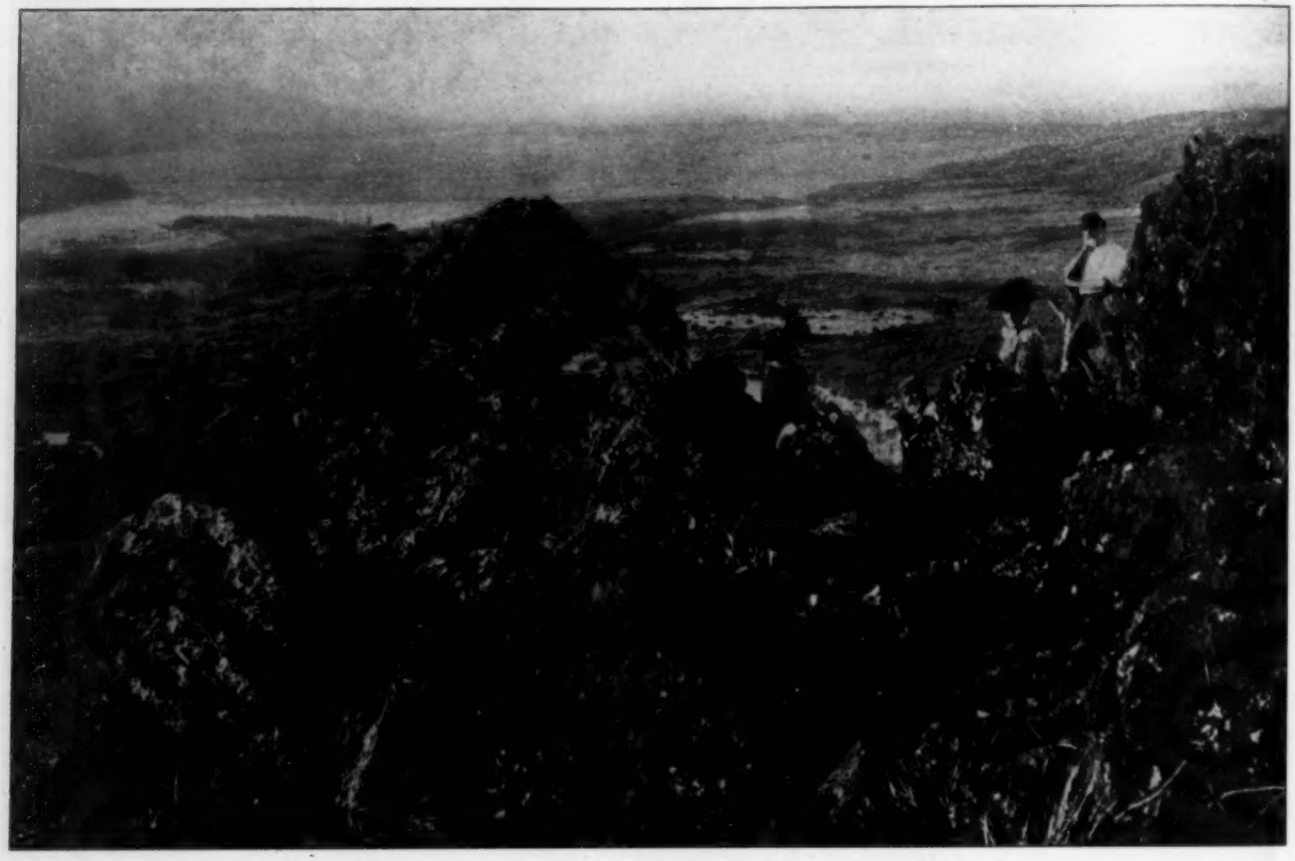
*See Report, Geological Survey of New Zealand, 1881, Pages 44-74.

as tertiary or cretaceo-tertiary. Forming a mantle over the whole district and often hiding the outcrops of the earlier rocks for wide areas, are thick deposits of glacial gravels and boulder clays. These are always somewhat auriferous, and where reassorted by stream-action, richly so having given in the past some important bonanzas. Some of the auriferous drift lies in deep sink holes in the limestones, produced by the sagging in of the roofs of caves which abound in this neighborhood.

The ore appears to lie in a syncline, composed of banded cherts and of quartzites. In intimate connection with the banded cherts are narrow beds of sideritic crystalline limestone, which is often rusty, due to the oxidation of the iron carbonate contained. As yet no detailed miscroscopic investigations have been made on the banded chert, but it appears to consist of narow layers of light colored chert, interbanded with thin layers composed of dark ferromagnesian minerals, and apparently magnetite. It is often highly pyritous. The ferruginous limestones, and banded cherts bear, in the field, a very striking resemblance to similar rocks, so closely associated with the great iron ore bodies of the Lake Superior region in America. The soft, rusty, and much decomposd banded cherts, so common in many of the American ranges, though not frequently seen at Parapara, may be observed in the mass of the ore body itself.

The width of the actual ore body averages at least nine hundred feet, though the iron bearing horizon is considerably wider. Broken by several gullies filled with glacial debris, the ore extends in a northwest and southeast direction, for nearly a mile and one half from the Parapara inlet, to and beyond the Onakaka river. In an absolutely undeveloped property, at present, of course, it is not known whether or no, the ore is continuous for this distance. Southward from the Onakaka, I am informed that the iron range continues for many miles, with frequent exposures of high grade ore. Mr. George J. Binns, formerly inspector of mines for the New Zealand government, estimates that in the area north of the Onakaka there are 51,835,600 long tons of iron ore actually outcropping, which could be removed in an open quarry.*

The ore is a hydrated ferric oxide botryoidal, mammillary, and occasionally concretionary in character. Apparently it always contains some manganese. Phosphorus and sulphur are in general low, though there are small quantities of other impurities principally lime, magnesia, alumina, and some silica. In general it may be spoken of as a highly porous, high grade hydrous soft ore hematite. Towards the north and west of the immense deposit the ore contains in places many small round quartz pebbles. This highly ferruginous quartz conglomerate is seemingly the result of glacial action, and represents soft ore, which intensely comminuted by the pressure of the ice has been mixed with its burden of quartz pebbles, and subsequently recemented into the conglomerate as it now outcrops. This part of the ore is auriferous, and so highly so in places, that it has been sluiced away for the precious metal. In depth the quartz pebbles are apparently lacking, and even on the surface, on the southern and eastern sides, and in the middle rarely appear, and the ore is consequently richer.



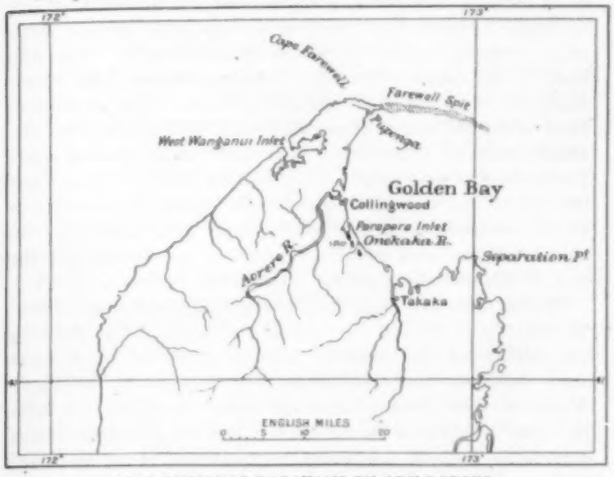
VIEW OF PARAPARA, SHOWING HEMATITE ORE IN FOREGROUND.

Seams of bituminous coal of fair quality outcrop within seven miles of Parapara, and twenty miles north occurs the Puponga coal basin, which is said to contain some of the best coal in New Zealand. Vast quantities of pure limestone suitable for fluxing, exist in the immediate neighborhood; much of the ore, however, seems

*Report of Geological Survey of New Zealand, 1878-1879. Pages 59-64.

to be self-fluxing. Unfortunately there is no good harbor on the eastern shore of the Cape Farewell peninsula, and when the tide is out, mudflats, a mile in width, border the shore. However owing to the sheltering action of Cape Farewell, this part of Golden bay does not suffer from very severe storms, and with a good roadstead, no difficulty has been experienced in loading the Puponga coal. Similarly it is thought that the Parapara hematite or materials manufactured therefrom could be comparatively easily shipped at high tide from a long wharf.

At present millions of tons of untouched high grade



MAP SHOWING LOCATION OF ORE BODIES.

ore ready for shipment, exist in this remarkable mountain of iron, within half a mile of high tide mark.

NO CHANGE IN MACHINE AWARDS.

(Special Correspondence.)

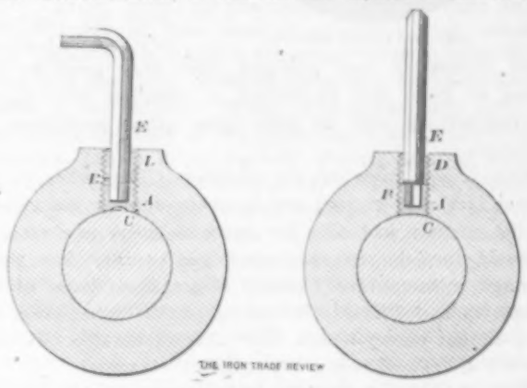
WASHINGTON, Nov 18.—Prominent officials in the purchasing departments of the war and navy departments state to *The Iron Trade Review* correspondent that in their opinion there is not the least likelihood that any change will be made in the present system of awarding machinery and equipment contracts, orders for new warships, etc. It is conceded that something in the way of a general purchasing agency will be established, but officials of the war and navy departments aver that in so far as these two branches of the government are concerned the new institution will deal only with such commodities as paper, ink and other like supplies.

Indeed it is freely declared in the two departments that no general purchasing agent, however, capable, would possess the technical knowledge essential to enable him intelligently and advantageously to place contracts for army and navy equipment and supplies and certain it is that the clerical force necessary, were these contracts as well as the others mentioned to be handled at a common center, would inevitably be so large as to make the centralized purchasing department a decidedly unweildy institution.

A NEW LOCKING SET SCREW.

Max H. Fischer, East Orange, N. J., has invented the locking set screw, shown in the accompanying illustration. This set screw has been designed in order to provide a set screw which will be free from the disadvantages of the ordinary type of set screw. The ordinary type of set screw has a tendency to become jammed either from rust, mutilation, or the lodgment of foreign substances in the threads, and the means provided for its removal usually prove inadequate when it is in this condition. When once broken or crushed in its adjusted position, it is extremely difficult to extricate the fragments. In the present invention these difficulties are claimed to be eliminated. The force exerted to cause the removal of the screw is applied throughout the whole length of the screw, thus doing away with any tendency to twist or break it.

The screw is shown in (A,) as applied to a shaft with the screw in process of adjustment. In (B) is a similar view showing the method of operating the locking device. The device consists, essentially, of a hollow engaging screw A closed at one end, and provided with an aperture B, which is hexagonal in shape. It is made in this form in order to follow as near as possible the contour of the screw without weakening it. The aperture, however, may be of any angular or irregular form that will not admit of the free rotation of the similarly-shaped key or wrench which is inserted. The closed end of the screw is beveled at C and provided with either a concave or convex face depending upon whether it is to be used on a flat or rounded surface. The locking part D is similarly constructed, but is open at both ends, the aperture extending throughout the entire length. The inner end of the locking screw and outer end of the set screw are provided with flattened faces, so that as the former is forced into



(A) NEW LOCKING SET SCREW. (B)

engagement with the latter there will be considerable friction between the abutting faces, which will serve to hold both the nut and locking member in position.

In operating, the locking piece is slipped on the shank of the key E, which is similar in cross-section to the aperture extending through it, and the latter is then inserted in the aperture in the member A. The two are then driven until the piece A bites upon the surface to be engaged. The key is then partially withdrawn, as shown in B, until it engages with the locking member only. This latter is screwed into firm contact with the upper surface of the engaging member securing it in position. In releasing the connection the locking member is first started until the key-shank is permitted to operate in the aperture in the engaging member, when both may be withdrawn either totally or partially.

The Technical Publicity Association at a meeting and banquet held at the Aldine Club, New York, Nov. 3, elected the following officers: President, C. B. Morse, Ingersoll-Rand Drill Co.; first vice president, H. M. Cleaver, Niles-Bement-Pond Co.; second vice president, Frank H. Gale, General Electric Co.; secretary, Rodman Gilder, Crocker-Wheeler Co.; treasurer, H. M. Davis, Sprague Electric Co.; members of the executive committee, Graham Smith, Westinghouse Companies and Chas. M. Manfred, Johns Manville Co. H. M. Davis addressed the association on "The Advertising Appropriation."

THE COLLEGE EDUCATION OF THE ENGINEER*

BY WILLIAM KENT.

One of the leading engineering periodicals recently made an editorial statement to the effect that there was an overproduction of college graduates in engineering. The argument was something to this effect: There are about 16,000 practicing engineers in the United States, and the colleges are turning out something like 3,000 men annually to fill the vacancies left by the death and the retirement of older engineers and the increasing demand caused by the growth of the country; and this crop of graduates is far too great for the country to absorb. They cannot all find positions after they graduate and many of them will be forced to abandon their career in engineering and go into some other profession or business.

DR. WILLIAM KENT

This is one view of the question. The other is the actual fact that in 1903 nearly every engineering college of the country had calls for twice as many graduates as it could furnish. In 1904 when the country was going through a temporary financial depression, some of the graduates had difficulty in finding places immediately but they all got places within two or three months. In 1905 again the demand was greater than the supply.

Why should the demand be greater than the supply? I have one established fact which may explain it. The United States Geological Survey has just issued a chart of the mineral production of the United States from 1895 to 1904. In the three years 1895, 1896 and 1897, when the country was recovering from the financial panic of 1893, the total value of the mineral production of the country was respectively 620, 622 and 631 millions of dollars. A revival came after 1897 and since that date the figures have been as follows: 698, 972, 1,063, 1,086, 1,260, 1,419 and 1,289 millions of dollars, the last figure, that for 1904, showing a decrease as compared with the preceding year on account of the temporary financial depression which followed the end of the "morganization" of industries, the collapse of the ship building trust, etc. The temporary depression is past, and undoubtedly the production the present year will reach one and a half billion dollars or about 900 millions of dollars greater than was produced only nine years ago. One fifth of the whole production will be pig iron; 6 percent will be copper; 7 percent gold and silver, and more than 30 percent will be coal, natural gas and petroleum. In order to produce this 900 millions of dollars increase in value of mineral productions in the United States in nine years, engineers have to be employed to design new mining machinery, to build new railroads, to open and develop new mines, and increase the ouput of the old ones; and after the mineral is mined to put it into the thousand various shapes it takes before it reaches the final consumer.

Growing Demand for Engineers.

This increase in the demand and production of the mineral wealth of the country alone calls for an increased production of engineering graduates far beyond the number that is necessary to supply the ordinary demand caused by the retirement of older men and by the normal growth of the country. Also the increased stored wealth of the country due to the profits made out of the handling of the enormous volume of the mineral wealth of the country creates a fund which has to be spent some way or other or it will produce no returns. If any man or any syndicate of men has a million dollars lying around loose he is anxious to find a means of investing it. He may loan it on bonds, but the company issuing the bonds must use it to build a railroad, or factory, or an electric light plant or some other structure which calls for the employment of engineers. This is the cause for the great demand for young engineers, and this is why for the last ten years the engineering colleges of the country have shown such extraordinary growth and why there is a continual call for new buildings and new equipment for the use of the ever-increasing crowds of students.

Where does the supply of young engineers come from? Principally, I should say, from the farms. The farming population of the country always tends to raise more sons than can find profitable employment on the farm. Many of these young men are forced to leave the farm in order to make a living. They hear of the wonders of electricity and of the great future there is in electrical engineering, and without knowing anything more about engineering or electricity than they know about law or medicine they flock to the schools. The number who are sons of engineers is very small for the reason that the number of engineers who are old enough to have sons of college age is as yet a small one.

It is a good thing for the engineering profession that its recruits are largely drawn from the farming population. There is no better blood in the country, whether considered from the standpoint of ancestry or of present personal character. The boys are strong in body, have good health, are somewhat used to hardship and have normal minds. Such is the material which the engineering college receives. It is very raw material. Not one in ten of the boys is what can be called a brilliant student, and the college has before it the task of taking the healthy young American with more propensity for physical exercise than for mental struggle and giving him such an education in four years as will make him a tolerable member of the engineering profession and worthy to be given a subordinate position in an engineering establishment.

The average student enters the engineering college at from 18 to 20 years of age with an ordinary high school education. In the college* with which I have the honor to be connected the entrance requirements are briefly summed up in the following groups:

Group I. English.
II. Mathematics, including solid geometry and advanced algebra, but not including trigonometry.
III. History (Greek, Roman and advanced United States).
IV. Free hand drawing.
V. Two years of one modern language.
VI. One year of either physics or chemistry.
VII. One year of either physical geography or geology, or botany and zoology.

Broad Culture Desired.

The object of making requirements in all of these seven

*Presidential address to the Technology Club, Syracuse, N. Y.

*L. C. Smith College of Applied Science, Syracuse University.

groups is to insure that the student has a broad foundation of general culture. The scheme omits Latin and Greek, the fine arts, logic and metaphysics, the different branches of sociology; also civics, physiology and bookkeeping, which are usually taught in the high schools. It assumes that some of these omitted subjects, such as physiology and civics, will of course have been taught in the high schools, and it leaves others, such as sociology, for the student to acquire by reading and by his contact with society during his whole lifetime. The conditions for entrance as above outlined are practically the same in all technical colleges in the country, and they have been evolved out of the experience of many years since the first technical schools were founded.

In the Freshman year the students in all branches of engineering have practically an identical course of study. It includes elementary physics or chemistry, whichever has not been obtained in the high school; English composition and rhetoric, trigonometry and analytical geometry, descriptive geometry and shop work. Not one of these studies can be called engineering. They are merely the foundations.

In the Sophomore year chemistry is continued with qualitative and quantitative analysis. Heat and electricity are studied as branches of physics. Mathematics is continued through to calculus. Kinematics is studied, and the mathematical theory of mechanics is begun. Practical work is given in general surveying, machine drawing, blacksmith and pattern work. This sophomore course applies to mechanical and electrical engineers. The civil engineers omit the kinematics and the machine work and machine drawing, and take instead a great deal more of surveying, theory and practice, and stereotomy. Still at the end of the two years the students have obtained only the fundamentals. They have been taught practically nothing of engineering design or of modern practice outside of the machine shop and drafting room.

In the third and fourth years the mechanical and electrical engineers study machine elements, elementary steam engine, thermo-dynamics, boilers, power plants, heating and ventilating, machine design and construction, electric machinery, light and power systems; theory and practice of alternating currents, etc. The course for these two years necessarily has to be made severely theoretical in order to give the student a proper understanding of the practical work which he will get after graduation.

The course thus obtained is practically uniform throughout the higher grade of engineering colleges all over the United States, and doesn't differ essentially from that of the best schools in Europe. It is, of course, imperfect, as all human institutions are, but it has been developed by the most careful thought of leading engineers and educators of all countries. It will necessarily be improved but the improvement will come by slow stages.

So much for the course; what are the results? As to this there is a wide difference of opinion.

Mr. Edison's View.

An opinion which is very commonly given in the following, recently quoted in an address by Dr. S. B. Christy, of the University of California, from the autobiography of Herbert Spencer. He mentions that in *The Speaker*, for April 9, 1892, Mr. Poultney Bigelow gives an account of a conversation with Mr. Edison, the celebrated American inventor. Mr. Bigelow says:

> To my question as to where he found the best young men to train as his assistants he answered emphatically: "The college bred ones are not worth a ——! I don't know why, but they don't seem able to begin at the beginning, and give their whole heart to the work." Mr. Edison did not attempt to conceal his contempt for the college training of the present day, so far as it made boys practical and fit to earn a living.

Dr. Christy, commenting on this statement, says of the words, "I don't know why, but they don't seem able to begin at the beginning and give their whole heart to the work," "Mr. Edison has put his finger with singular acuteness on the principal failing of improperly trained college students. The reason why they are not willing to begin at the beginning and give their whole heart to the work is because their education has often been so exclusively theoretical that they are filled with conceit of learning and have an inordinate idea of their untried abilities. Hence their unwillingness to begin at the beginning."

This quotation from Mr. Edison, it will be noticed is 13 years old. I have no doubt that if Mr. Edison's attention were called to it to-day he would modify it considerably. I think, for instance he might say that the college bred ones are not worth a —— *for the first two years*, or he might say *some* of the college bred ones, for I know that Mr. Edison has had in his employ many college bred young men whom he advanced to responsible positions, and who after they left him rose to occupy the highest positions that electrical engineering offers to any man in the world.

Temporary Egotism.

Dr. Christy says that the college students have an inordinate idea of their untried abilities. Well, what if they have? It is only a temporary matter with them. They lose that idea, some of them in a few months and others in two or three years. The reason why they are not willing to begin at the beginning is not because their education has been so entirely theoretical, but because they are young men of average type. They are immature and they have not that kind of wisdom which is possessed only by men of mature age. But the criticism that they don't seem able to begin at the beginning and give their whole heart to the work should not be made generally of college graduates, for a large fraction of them do begin at the beginning with "overalls and grease," as has been said; and with proper encouragement on the part of superintendents and foremen they do give their whole heart to the work.

As the result of thirty years' acquaintance with graduates in engineering I may say that I do not know of any body of young men who are more enthusiastic in their work than the engineers are. The general statement of the worthlessness of college graduates should be modified by making it apply only to some college graduates and only to the first two or three years after graduation. If they remain worthless beyond this length of time they do not become engineers but go into other lines of business. In the words of Professor Dugald C. Jackson, in a paper read before the American Institute of Electrical Engineers in 1893:

> The old prejudice is still held against "college men" in the minds of the so-called "practical men" who had grown influential in engineering practice without having had experience of college life and training. Happily the foundation for this prejudice has ere this been destroyed by the influence of the industrial results achieved by college men. The old prejudice, so far as it now exists, has more particularly drifted into the way of criticism of the engineering schools rather than their graduates, and the character of the schools and the training they afford are subjects of eager discussion in engineering circles. It is the business of the engineering colleges to produce, not finished engineers, but young men with a great capacity for becoming engineers, the goal being obtained by the graduate only after years of development in the schools of life.

One of the causes of the defects of the average engineering graduate is the unsatisfactory preparation he has had before he comes to the engineering college. In a more recent paper by Professor Jackson, read before the Central Association of Science and Mathematics Teachers, he says:

> As the pupils now come to the colleges from the secondary schools,

they ordinarily possess little power of clear thinking, power of initiative, regard for accuracy or understanding of continuous intellectual effort. It is true that they are not yet mature in either body or mind, and too much should not be expected of them. But it is also true that their preparatory schooling has left them with a defective acquaintance with the construction of the English language and the spelling of English words, a still more defective acquaintance with French or German, or a fairly good grounding in elementary Latin, a smattering of civics and history, a training in the elementary principles of arithmetic, geometry and algebra, from which the factor of accuracy in application has often been omitted, and perhaps an enthusiastic though often misguided interest in the physical sciences.

The unfortunate situation is perahps a result of the inexperience of school or the inexperience, inadequate compensation, or improper training of a large proportion of the teachers, or the crowding of the schools may overwrk and cramp the best of teachers. If the causes that contribute to allow the pupils to reach the end of the secondary school training with their originality sleeping, their normal sense of accuracy lost, and their best accomplishments in mathematics a parrot-like following of hackneyed methods in familiar problems—if the causes from which these conditions spring are anchored in overcrowded classes, then it is your duty and privilege to cry aloud for more air, more breath of life, more chance to teach living individuals instead of the average of an inert class.

Some Other Complaints.

Mr. J. A. L. Waddell, the eminent civil engineer, who for six years of his life was also a teacher of civil engineering, makes the following complaint about engineering graduates:

. . . not only does my firm employ constantly new graduates of technical schools from all over the United States as well as from Canada and Japan, but during my travels, which average about 50,000 miles per annum, I meet a great number of engineers, with whom I discuss such matters as technical education. Nearly all of them have complaints to make concerning the deficiencies in the training of the recent graduates of technical schools.

In regard to the defects of engineering graduates Mr. Waddell says:

Among the most important deficiencies noted by practicing engineers in the recent technical school graduate are inability to express himself correctly and forcibly in either writing or speaking, lack of all ideas of system, inaccuracy in computations, ignorance of money values and economics, slovenliness in drafting, ignorance of what a drawing should contain to make it complete and serviceable, failure to understand the practical application of what he has learned in his technical course, and unacquaintance with numerous little practical things they ought to have learned.

In regard to bad English he says:

That the study of the English language is sadly neglected in our technical schools, nobody is likely to deny; for the English spoken by the majority of their graduates is atrocious; their letters are awkward, misspelled and ungrammatical; and their ability to write reports, specifications and contracts is practically *nil*.

Similar complaints are made in England. Professor John Perry, one of the most distinguished educators in Great Britain, head of the Finsbury Technical Schools in London, in an address before the engineering section of the British Association in 1902, says:

Well-equipped schools of applied science are getting to be numerous, but I am sorry to say that only a few of the men who leave them every year are really likely to become good engineers. The most important reason for this is that the students who enter them come usually from the public schools; they cannot write English, they know nothing of English subjects; they do not care to read anything accept the sporting news in the daily papers; they cannot compute; they know nothing of natural science; in fact they are quite deficient in that kind of general education which every man ought to have.

I am not sure that such ignorant boys would not benefit more by entering works at once than by entering a great engineering school. They cannot follow the college courses of instruction at all in spite of having passed the entrance examination by cramming. Where after a while they do begin to understand what goes on in a work shop; and if they have the true engineer's spirit their workshop observation will greatly correct the faults due to stupid school work.

The *Electrical World and Engineer* of March 26, 1904, quotes Doctor Walmsley, an Englishman who visited this country to study our industrial and technical matters as saying:

It is a matter for serious consideration whether the excessive amount of time given to manual work in the manual training schools, has not been dearly purchased at the expense of starving the time which should have been given to mental training.

The *Electrical World* commenting on these statements, says that as things are at present the higher technical institutions are busy for no inconsiderable part of the course in filling the gaps left by kindergarten foolishness of various sorts in the primary and secondary schools. They admit students of 18 or 19 years of age, and then spend the better part of two years in teaching them elementary English, mathematics and modern languages that have been neglected in the secondary schools to make room for nail driving, music, painting and amasculated physiology. It is of vast credit to the technical schools that in the four years' course they can turn out the material they do in spite of inefficient preparation.

Are the Schools to Blame?

The shortcomings of the technical graduates are by many of the critics attributed to the shortcomings of the technical schools themselves. Much has been written in recent years in criticism of these colleges and their methods. Dr. Walmsley is quoted as stating that many conversations with American manufacturers brought out as the most general criticism that in many cases the training is too superficial and too apt to overload the student with a large and confused assortment of facts instead of training him in principles, this being in large measure due to attempts to deal in too much detail with a crowd of subjects, especially in the last year of the course. The strongest critics of the schools are the leading educators themselves. Professor Perry, in the article already referred to says:

I know of nothing worse than that an engineering student should be taught mathematics or physics or chemistry by men who are ignorant of engineering, and yet nothing is more common in colleges of applied science. Mathematics and physics and chemistry are usually taught in water tight compartments, as if they had no connection with another. In an engineering college this is particularly bad. Every subject ought to be taught through illustrations from the professional work in which a student is to be engaged. . . . One most important fact to be borne in mind is that efficient teachers cannot be obtained at such poor salaries as are now given. An efficient laborer is worthy of his hire; an inefficient laborer is not worthy of any hire, however small. Again, there is a necessity for three times as many teachers as are usually provided in England. The average man is in future to be really educated. This means very much more personal attention and from thoughtful teachers.

President Humphreys, of the Stevens Institute of Technology, in a paper on "The Crowding of the Curriculum," read before the Society for the Promotion of Engineering Education, 1904, says:

Not only are the courses in our best technical colleges becoming crowded at the expense of efficiency, but I am strongly of the opinion that the same criticism applies to the preparatory and other schools. Thoroughness and power to do has been sacrificed to a wrong conception of breadth. The introduction of fads has resulted in superficiality. There is a limit to the powers of absorption of the young mind, and I believe that in our elementary schools we have reached and passed the limit. I advise those professors in our technical schools, who have not yet done so, to test their students of the higher classes in the fundamental work required for admission. The failure of these students is due to two causes. First, they never have been thoroughly trained, owing to the crowding to the courses in the schools; second, what they have thus partially learned has often been crowded out or blurred over due to the crowding of the college course. In both school and college they have been so hurried from subject to subject that they have been unable to get that grasp of any subject which only comes from the opportunity to rest on it and apply it. . . . At present there is in many colleges too much independent work by the several departments. No one department should be allowed to add or change its requirements without full consideration of the course as a whole. The work of each department should be made to reinforce the work of every other department.

Another reason why the engineering graduates of many colleges are not as well educated as they should be is the overcrowding of the schools and the coming in of students in greater number than can properly be accommodated with the facilities offered.

Just before the death of Professor Thurston, the late director of Sibley College, in 1903, he made an appeal to the trustees, in which he says:

The present situation in Sibley College, regarding the need of an extension of space and facilities for teaching is one of the gravest import.

The present facilities in Sibley College are reasonably adequate for the proper instruction of six to seven hundred students in all branches. . . . At the present time the number of students registered in Sibley College is a little over 950. . . . In shop work the pressure has been so great that large numbers of students who have had some previous training have been passed up, simply to make room for those who had had no such training, and for whom, therefore, space must in some way be made. Under normal conditions the students thus passed up would profit greatly by further training in shopwork methods. Even with these measures of relief the numbers remaining are so great that it has been found almost impossible to make the needed adjustment of sections and hours, and in several cases men have been forced to wait some considerable length of time before a place could be found for them.

In free hand drawing the sections number from 30 to 40 already, and are entirely too large for the best work on the part of the instructor. In experimental engineering the same general conditions exist, and it has been found necessary to make laboratory assignments by threes instead of by twos as we should consider most desirable. Throughout the other departments of the college the condition is but little better, and it is not too much to say that the quality of our instruction is menaced by reason of the exising overcrowded condition.

Among the several remedies proposed by different writers for the overcrowding of the technical colleges and for the insufficient preparation of the students who enter them is that of inducing as many students as possible to get some practical experience in a machine shop or other engineering establishment before coming to college. It will be many years, however, before any large fraction of the students of an engineering college can be induced to take this step.

Mr. C. J. H. Woodbury, in a lecture delivered at Sibley College in 1901, said:

A question which has often been discussed among the friends of technical instruction asks which should come first, the teaching in the school or the practical experience in the mill or shop? The best opinions on the subject seem to agree that there should be an alternation and that technical instruction should be prefaced by a sufficient amount of practical experience to give a purpose to the work of the student and to impress upon him the necessity of a further knowledge of the subject to which he proposes to devote himself for an occupation.

On this subject the present speaker, in a lecture at Sibley College in 1903, said:

If I were to plan a course of preparatory instruction leading to a student's entering an engineering college at the age of 19 and graduating at 23 with the degree of civil, mechanical or electrical engineer, I would give him as broad a training as possible in the preparatory school qualifying him to enter either the philosophical or scientific course of the Liberal Arts College of the university at 17 years of age. I would then send him, not to the Liberal Arts College, but into a machine shop, where he would have to work ten hours a day for one year. Here he would get a taste of the kind of experience which every engineer must get sooner or later. He would get there some knowledge of the world, of industry, of the methods of handling men, of the value of time. He would learn there that engineering is not only the science and art of utilizing the forces of nature for the benefit of man, as Tredgold defined it, but also that it is the art of overcoming the resistances of nature, including human nature. He would learn something of the kinds of human nature with which he will have to deal in later life. He would get physical and mental strength. Above all he would "find himself," as Kipling expresses it, and learn whether or not he had made a mistake in deciding to become an engineer. If all candidates for entrance into an engineering college were compelled to take this preliminary year in the shop, perhaps 10 or 20 percent of them would discover before the year ended that they were not adapted to become engineers, a fact which without the shop they might not discover until after they had graduated from the college and entered practical life. This shop training, for the 80 or 90 percent who find by it that they have the natural capacity to become engineers, would be of great value to them in their subsequent college course. It has been the general experience of teachers of engineering that those boys who have had some experience in a shop make the best engineering students.

The most numerous critics, both of the college graduate and of the college itself are generally those with the least experience and least knowledge of the subject. The man that says: "I know that college graduates are no good because I have had experience with them," probably has had experience with one or two men who had just graduated; and the one who criticises the technical colleges for giving the student too superficial an education and crowding him with facts instead of training him in principles probably does not know what the schools are really doing.

Criticism Welcomed.

Probably no body of men welcomes criticism as cordially as the heads of departments in the leading technical schools. There is a society for the promotion of engineering education which has existed for the last 12 years and now has enrolled about 400 members; the great majority of them professors in technical schools but about 50 of them are engineers in practice who are not teachers, and this society practically exists for the very purpose of criticising the methods of engineering education and for finding ways to improve it. Practically every national and every local engineering society has at one time or another discussed the subject of technical education; and the technical and trade papers of the country are continually giving advice to colleges. Statistics are constantly being compiled to show the progress of different colleges and compare the one with another. The leading technical educators of the country are constantly on the lookout for new ideas; they travel and read and discuss the subject nearest their hearts whenever there is an opportunity, and if the technical colleges come far short of their ideals, and of the still higher ideals which many editors would impose on them, it is not from any lack of will on the part of those in charge of the colleges to make innovations and improvements. The trouble is that the colleges themselves are limited by conditions which are at present beyond their control.

Whatever may be the shortcomings of the technical schools, the fact remains that they are turning out a large body of men every year, a considerable fraction of whom find their way in the short space of ten or fifteen years into the higher ranks of the profession, where they become employers of the younger graduates. A larger fraction remain in subordinate positions while some find more lucrative positions outside of the profession. The percentage of failures is probably as low as that of any other profession and these failures are not due to the schools but to the men themselves.

Cause of Shortcomings.

The chief trouble with the schools and the chief complaint with regard to them is not concerning the small fraction who by reason of exceptional ability rise rapidly to positions of distinction, nor concerning the small fraction that are total failures, but it relates to that very large fraction who in the first year or two after graduation are great disappointments to many employers. The shortcomings of these young men are various and have all been referred to at great length above but it may be well here to summarize their causes, real or alleged:

(1) The nature of the boy himself, immature, careless, happy-go-lucky, possibly indolent. All of these defects may be cured within a year or two after graduation.

(2) The imperfect training he has had in the preparatory school. This is gradually being improved.

(3) The insufficient length of the course—four years—in which to take a poorly prepared boy and turn him out with the knowledge and experience which many employers think he ought to have. This cannot be remedied. A boy had better spend four years in getting a partial education in a college, then two years in a shop, than to spend six years in a college and then arrive at the shop too late in life to be willing to begin at the bottom.

(4) Wrong methods of training in the engineering courses. Too much theory, too little theory. Too much practice, too little practice. All these objections are made by various critics. If the courses are not what they ought to be, they are being improved as fast as possible.

(5) Lack of qualifications of teachers and instructors.

(6) Insufficient laboratory equipment.

(7) Too large classes.

Remedies Suggested.

The three named causes of poor performance in the technical colleges are no doubt true of many of them. They are due not to lack of knowledge on the part of the managing officials of the colleges as to what the college should be, but solely to lack of funds. Much of this lack of funds is due to the exceedingly rapid growth of the schools themselves. The number of students tends to increase at a faster rate than the endowments. There are two remedies for this lack of funds. One, more endowments; the other the increase of tuition fees. The most of the engineering colleges have before them four alternatives.

(1) To limit strictly the number of students which can be admitted.

(2) To increase the endowments.

(3) To increase the tuition fees.

(4) To diminish the efficiency of the work. It is to be hoped that no college will choose the last of these alternatives. If it does, it will not only deservedly lose its prestige but will be doing a wrong to the students who enter its walls. The high school graduate who enters any high grade engineering college to-day has a right to expect that that college will furnish him the best opportunities to obtain an engineering education that the world has to offer and this is just what every college should do everything in its power to accomplish. As President Humphreys says:

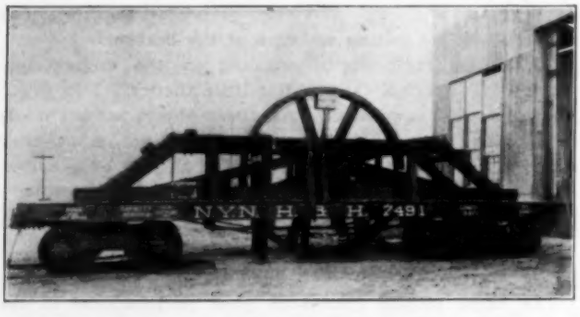
> No matter what the progress in science and engineering, it will take four years of honest work in our best engineering colleges to prepare our men to properly appreciate the progress in these departments. The theories included in our elementary work have to be amended from time to time, but this does not add to the burdens of the course—these are only substitutions.
>
> But no matter what we may thus do in the way of substitutes, we cannot reasonably expect to turn out thoroughly trained engineers in four or five years, in six years, or seven years. . . . Independent of the question of the time to be devoted to undergraduate work there is something the student must get outside of the college walls. He has much to learn through actual experience in the world of work. He must through experience learn to do. . . .

The national and local engineering societies and the individual members of these societies, nearly if not quite a majority of whom are themselves graduates of engineering colleges, have in the past been of great assistance to the colleges through their numerous papers and discussions on engineering education, through their willingness to employ the recent graduate with all his deficiencies, and many of them by actual contributions of funds for buildings and equipment. This good service of practicing engineers is bound to continue and the result will be a constant growth and improvement of the colleges. I conclude with the following words of Dr. Thurston at the Engineering Congress in 1893:

> The profession of modern engineering exacts from its members a more extended preparation and a more arduous professional course, than are commanded today by the schools of either law or medicine, and this fact, if there were no other corroboration of the conclusion, has fully established the engineer in his position as a member of a profession and of a learned profession. . . .
>
> Upon the thorough education of our engineers depends very largely the future progress of the nation.

Method of Loading Large Castings For Shipment.

The National Steel Foundry Co., New Haven, Conn., which manufactures open hearth steel castings for all purposes, very frequently has occasion to ship large



METHOD OF LOADING LARGE CASTINGS FOR SHIPMENT.

castings of circular form, such as pulleys, rotors, armature spiders and electrical machinery. The method of loading these for shipment is shown in the accompanying illustration. The casting shown is a rotor shipped to the Stanley—G. I. Electric Co. The diameter was 11 ft. 6 inches, and the weight 13,800 pounds. The mold from which the casting was made was built of cores exclusively. The cradle on the car allows sufficient clearance for the casting to pass over tracks, making it very easy to secure castings of this class for transportation.

FINE ENGINEERING BUILDING.

Cleveland-Cliffs Iron Co. Moves Into New Home.—Its Progress.

(Special Correspondence.)

ISHPEMING, MICH., Nov. 18.—The Cleveland-Cliffs Iron Co.'s engineering department is moving into its new home here, probably the finest building of its class in almost any mining region. In it are being gathered the various officers of the engineering department of a company whose remarkable growth and substantial position are most notable, and a company, withal, whose altruistic motives and whose broad and liberal views of the good of its employes and of the citizens in whose towns it is interested are probably excelled by none anywhere.

This building is three stories high. The lower two are occupied by the engineers and the third is fitted up as a club and is open to all members of the Cliffs Club, which is primarily an organization of employes of the company, but includes others as well. The building is connected with the main office building of the company by an inclosed passage, and has an excellent view of Lake Bancroft. It has ample grounds and these President Mather has had made beautiful under the direction of a well-known landscape architect from Boston, so that the entire surroundings are most artistic. The entrance is through a wide vestibule to a main hall 18 ft. long and 13 ft. wide. Out of this open the offices of the geological department, and opposite these is another hall leading to all other rooms on that floor and to the passage to the main office building. Here are store rooms, lockers, baths, mine clothes rooms, fireproof vaults and instrument store rooms. On the second floor are handsome drafting, geological and map rooms, photograph and blue print rooms, as well as the private offices of the men in charge, and a library, calculating room, and other apartments. On this floor, too, is a central telephone room, connecting by a private exchange with all main offices of the company.

Progress of the Company.

The Cleveland-Cliffs Co. is increasing its activity in a marked degree, and is fast taking new mines and lands for development. In addition to the old mines at Ishpeming, the splendid Negaunee, and the well-known Ashland, at Ironwood, from which it is making a big production this year, it has numerous properties elsewhere, among them, some on the Mesabi range. One of these, the Crosby, is to be opened for mining the coming year. Some development was done there last year, but was stopped on account of pending legal proceedings and an unexpected change in the character of the ground worked in. The company is developing old mines on the Western Gogebic, which have not been thoroughly explored, and has now taken under option 2,000 acres on the eastern part of that range, near Wakefield. Diamond drills are to be operated on these lands during the winter and later. It has recently bought the Princeton mine, close to its new Austin property, on the Cascade range, south of Marquette, and has a large area of unexplored but favorably located lands in that district. The Austin is now making its first shipments to the company's furnaces, and the ore is proving very satisfactory. As is generally known, the company holds a one-fourth interest in the Lake Superior and Regent groups of mines, operated by the Oliver Iron Mining Co. at this city and Negaunee. It owns the Maas mine, which is now being successfully developed into a large and first-class producer, after long and costly preliminaries, it has a half interest and is in complete charge of the Negaunee mine, which adjoins the Maas and is

known to contain an ore deposit running well into the 20,000,000-ton class, and it holds much favorable land in the vicinity.

Woodland and Railroads.

For several years the company has been buying lands throughout the upper peninsula, suitable for deforesting for its charcoal furnaces, and for other purposes, and it now has an enormous acreage of high-grade hardwood lands. From these lands it is taking its wood for the fuel in its two large charcoal furnaces, one at Marquette and the other at Gladstone, and it is selling the cut-over lands at low prices for farming purposes. Its cordage on these lands reaches a stupendous figure, as it should, for the daily cut to supply its furnaces is many acres.

Some years ago, on the refusal of the Duluth, South Shore & Atlantic road to reduce its ore-hauling rates from Ishpeming to Marquette from 40 cents a ton, the distance being 12 miles, the company built the Lake Superior & Ishpeming, and has since carried the bulk of Marquette range ore at the rate of 25 cents a ton. This road is owned jointly by the Cleveland Cliffs Iron Co. and the Pittsburg & Lake Angeline Iron Co. It was the beginning of a system of railroads that is fast covering the northern part of the upper penisula, and connecting the various industries of this company as far east as Gladstone and Munising. The second of these roads is the Marquette & Southeastern, and this line has been building toward the east for some time. The company has for several years owned and operated some lake ships in the carrying trade, but is now increasing this fleet and proposes to have ships enough of its own and closely associated with it, to handle nearly all its probable annual production.

Subsidiary Enterprises.

The company maintains a number of subsidiary enterprises, the chief of which is the furnace industry. It has a daily capacity of 250 tons of high grade charcoal iron, and in the course of making its own fuel for this iron it turns all its by-product of combustion into methyl alcohol, acetate of lime, and the like. It carries on a large experimental nursery for the benefit of its employes, and others who may desire to take advantage of it, and is conducting extensive experiments in plants and trees suitable for the northern climate. It has bought all of Grand Island, near Munising, and is stocking it with wild game, as a preserve, and the village of Munising is showing the effect of its presence in its rapid and solid growth. A very large pulp and paper mill is being built there by an associated interest and many other wood industries are going in under its influence or by its capital. There is no space in this brief article to tell of the company's broad-minded and successful efforts to beautify the town of Ishpeming, but the effect has been remarkable and noteworthy.

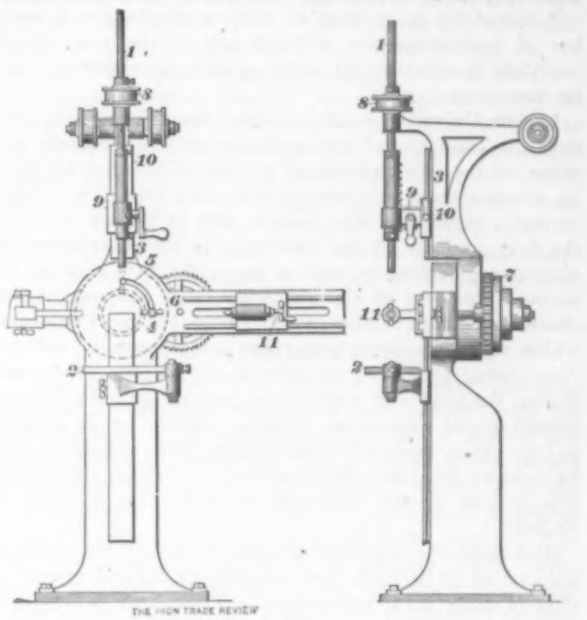
It is difficult to forecast the future of the Cleveland Cliffs Iron Co., but the logical development is along the line of increased mining and, ultimately, steel-making, for which it has an admirable site at Toledo, with the full development of all profitable forms of subsidiary enterprise that are seen to fit naturally into the scheme that has of late years grown up in President W. G. Mather's able mind.

Cable advices received in New York last week from Bilbao, state that the Altes Hernes de Viscaya mills of that city had received orders for 21,000 tons of rails for use in the construction of a railway in California. The contract price including duty, is to be $27 a ton. This is said to be the first American rail contract ever placed in Spain.

COMBINED DRILLING MACHINE.

Adolph Bauser, has invented and patented a machine which he calls a combined auxiliary machine. The purpose of this invention is to provide a combined drill and speed lathe, which can be readily converted into either a lathe or a drill. Another object of the invention is to provide the machine with a drill-spindle which can be adjusted to any desired angle with the horizontal and which can also be adjusted for use as the center or chuck of a lathe.

The invention consists of a standard having a laterally-extending arm at its upper end on which is adjustably mounted a tail-stock. At the upper end of the standard is an adjustable arm which may be revolved. This arm has pulleys journaled thereon and is provided with brackets in which is mounted a revolving spindle having a pulley secured to it. Power-transmitting mechanism is arranged upon the standard and fixed arm, and means are employed whereby



COMBINED DRILLING MACHINE.

power is transmitted from this mechanism to the pulleys on the adjustable arm.

When it is desired to use this machine for drilling purposes, a suitable drill is secured to the lower end of spindle 1 and the table 2 is adjusted to a desired height. The arm 3 is swung upward until the guide-pin 4 contacts with the lower end of slot 5. The jam-nut 6 is then turned so as to clamp the parts in their adjusted positions. Motion is transmitted from gear 7 to a pinion and belt pulley on one shaft. From this pulley it is transmitted to the pulley 8 on the spindle 1. It will be understood that spindle 1 can be adjusted vertically while it rotates by loosening the set-screw and moving the bracket 9 upon its guide 10. When it is desired to use the machine as a lathe, jam-nut 6 is loosened and the arm 3 swung into a horizontal position. When in this position the guide-pin rests within the upper end of slot 5 and can be secured by the jam-nut. The spindle 1 aligns with spindle 11, and the article to be worked can be very readily secured there and rotated.

As an experiment the officials of the A. L. Swett Iron Works, Medina, N. Y., offered an inducement of 25 percent of their yearly salary to every employee who worked every regular working day during the entire twelve months. At the end of ten months, it is stated, that not a single man in all the shops had fulfilled the agreement. The foremen were not permitted to enjoy the privileges of the offer.

TECHNICAL SCHOOLS ACTIVELY BUILDING.

The unusual activity and enormous capital involved in building operations during the last year in business circles is paralleled by the great number of new laboratories and buildings that are being erected by the various colleges, especially in the engineering departments. At almost every institution significant improvements in equipment and facilities for technical instruction mark the endeavor for bringing the training of our future engineers into as nice an accordance with industrial conditions as may be. This notworthy and general erection of new buildings has been made possible by and is the direct result in many cases of prosperous business conditions for the various donations are nothing more than a turning back of profits into capital.

A few of the many items of interest attaching to a number of institutions are at hand, and in the near future complete descriptions of some of the new buildings will be presented.

Lehigh University.—The college year at Lehigh opened very auspiciously and was made the more noteworthy because of the inauguration of President Drinker on Oct. 12, which is the anniversary of Founder's Day. Dr. Drinker was a member of the class of 1871 at Lehigh and was the first graduate of the institution in the department of mining engineering as well as being the first alumnus to become president of the university. He was one of the charter members of the Institution of Mining Engineers, which was organized during his senior year in college. After being graduated he entered the employ of Lehigh Valley Railroad and while there became an authority on tunneling and explosives. Having studied law he became in later years, counsel for this railroad from which position he resigned to accept the presidency of Lehigh University. The college is very fortunate in having Dr. Drinker at its head.

At Lehigh the engineering societies among the students are carried on perhaps more enthusiastically and earnestly, than in many other institutions. Their work is seriously scientific and conforms to the various branches of engineering offered in the university. At a recent meeting of the Civil Engineering Society papers were read and discussed on "The Construction of a 'Duck Under' on the Pennsylvania Railroad," "The Use of Electricity for Transmission on the Long Island Railroad," and "Topographic Survey for the Pennsylvania Highway Commission." The work in the various societies is entirely voluntary but the success and value of these institutions to the student life has brought into the attendant discussions a great deal of thorough and accurate study.

Purdue University.—The experimental locomotive of Purdue University which has been recently used especially for the determination of the value of very high steam pressures, is to be fitted out with a Cole superheater and will be ready for additional tests early in January. While this engine is being equipped a New York Central Atlantic type locomotive is to be installed upon the testing plant for use under the direction of the Master Mechanics' committee on Front-Ends. The special determinations for which this engine is to be tested will, it is expected, add to the knowledge of the constants in such equations as may be necessary to good design of front-end mechanisms. The committee overseeing this work consists of H. H. Vaughan, superintendent motive power, Canadian Pacific Railway, Chairman; F. H. Clark, general superintendent motive power, C. B. & Q. R. R.; Robert Quayle, superintendent motive power and machinery, C. & N. W. Railway; A. W. Gibbs, general superintendent motive power, Pennsylvania Railroad; W. F. M. Goss, Purdue University, and G. M. Bashford, American Locomotive Co.

In addition a model locomotive has just been presented to the university by Henry F. Shaw of Boston who is prominent in railway circles in connection with the problem of balancing the reciprocating parts of locomotives. The model is constructed on the scale of one inch to the foot, and embodies the latest designs perfected by the donor.

Norwich University.—The university has two new buildings in the course of construction; one, Alumni Hall, being nearly completed and the other the Carnegie Library building, well started above the ground. A new central heating station is being equipped with boilers and distributing mains. The work of construction on the campus is being used as a means for instruction in practical building and is in charge of Prof. Carleton.

Case School of Applied Science.—Work on the new physics and mining buildings which has been delayed greatly as a result of strikes and bad weather has been progressing more rapidly of late so that their completion may be looked forward to in the no very distant future. The electrical department under the direction of Prof. Dates, who was appointed to succeed Prof. John W. Langley, has undergone many changes which it is anticipated will add to the effectiveness of the instruction in the electrical work. The laboratory is being rewired by the students, involving the setting up and arrangement of a variety of apparatus and a station switch board.

A complete new boiler plant has been installed in the Power Laboratory in the last year making possible a central heating station and on the five boilers an opportunity for studying a variety of stokers, methods of running for low and high pressure work.

A new 50-ton transverse testing machine has been installed considerably broadening the possibilities in the course on "Testing materials."

Columbia University. Department of Applied Science.—The enrollment of new students in the engineering departments amounts to 135. A new laboratory which is to be devoted to the study of electro-chemistry has been nearly completed and the mining and metallurgy building, a gift to the university from Adolph Lewissohn, is now being occupied. Instead of the degree, B. S., which was formerly conferred upon graduates in the chemistry courses students finishing in the school of chemical engineering will receive the degree of either "Chemist" or "Chemical Engineer."

Worcester Polytechnic Institute.—Trustees of the institution have appropriated $13,000 for the enlargement of the equipment of the power laboratory, which will provide for two new 200 h. p. Stewart boilers, a 175 h. p. Westinghouse compound engine and a 60 cycle, two-phase revolving field generator. And the American Steel & Wire Co. has donated a new collection of samples of cables to the electrical department. A new chair in electric railway engineering has been established and Albert Sutton Richey of Indianapolis, Ind., has been elected assistant professor in this department. Prof. Richey comes from an extended experience gained in the employ of Indiana traction companies, with which he has been associated ever since being graduated from Purdue University. Prof. Richey delivered an interesting lecture on "Some Engineering Features of the Indiana Union Traction Co." before the electrical engineering meeting held Oct. 13. The Worcester Polytechnic Institution is to be congratulated upon its monthly journal which speaks highly for the efforts of its editorial staff when one considers the difficulties attending such a publication in a technical school.

STILL CLIMBING.

Prices of Unmarked Bars Advanced.—Eight-Hour Agitation in England.

(Special Correspondence.)

BIRMINGHAM, ENGLAND Nov. 7.—Although the most urgent requirements of buyers have now been met the past week has brought quite a batch of further advances. Unmarked bar makers promptly took their cue on Thursday last from the marked houses and put up their prices 5s. making the minimum £6 15s. As this figure is already being got the new standard promises to be of short duration. A number of makers suggested £7, but the majority took the cautious view. North Staffordshire bar makers issued a circular making the standard £7. Steel strip makers added another 5s. making the minimum £7 10s. Cold blast pig smelters following the marked bar lead added 5s. to pigs making the standard £5 5s. Roll casters held a meeting and on the plea of dear raw materials raised the price of chilled rolls, part and soft chilled £1 per ton, grain and grooved rolls and other mill and forge castings 10s. per ton. Since the weekly meeting the Coach Ironworks Association has decided to reduce gross discounts 2½ percent for both home and export trade, which is equivalent to 5 percent advance in net price. Business in this line is very active, especially for Australasia, India, and South America. This completes the list of official advances, but nearly everything is correspondingly dearer, with pig iron in an especially strong position. Some lots of Northampton have changed hands at £2 15s. and a week hence this is likely enough to be the general figure. Coal is also a shilling dearer, though the market is far from strong.

Pooling Not Favored.

The meeting of bar makers presided over by Sir George Hingley discussed the form the proposed re-established organization is to take, but it is understood the pooling idea found little favor, and this will probably be dropped. The feeling among the numerous makers will have to be much stronger before any such step becomes possible. But the trade generally is determined to make a serious effort to come to some understanding on the question of maintenance of price.

Eight-Hour Agitation.

The eight-hour agitation has broken out in a fresh place. On Friday 100 men employed at Messrs William Roberts (Ltd), Tipton Green furnaces came out on strike for a reduction of their hours from twelve to eight per day. It is understood that the movement orginated with National Federation of Blast Furnacemen whose efforts in the direction of shortening hours has met with some success elsewhere. The men are encouraged in their demand by the fact that Sir Alfred Hickman some time ago conceded the eight-hour system at his Bilston furnaces. It will be remembered that a short time ago an effort to introduce the system at the works of the Kettering Iron Co. as well as at the Islip furnace, Northamptonshire proved abortive. The differences of the working periods at various establishments are causing much embarrassment. There is a widespread impression in iron circles that the men at the South Staffordshire furnaces will succeed in their demand.

Vanadium Discussed.

Alex. Tucker's paper on vanadium steel for motor building referred to in a previous letter has led to a very interesting newspaper correspondence in which T. Vaughan Hughes is taking a leading part. This expert throws doubt generally on the contention that vanadium steel is a reliable resister of shock, putting forward the proposition that ordinary steel of good quality can by thermal or heat treatment be rendered highly resistant to vibratory or shock stresses. A third combatant has now entered the lists in defence of vanadium steel in the person of J. Kent Smith of Chester, who read a paper at the Institution of Mechanical Engineers, in December last, in conjunction with Capt. H. Riall Sankey, R. E., and who warmly contends that with proper treatment the new steel will yield far better results than the best ordinary metal. A further paper on the subject is to be read shortly before the South Staffordshire Iron and Steel Institute.

Death of Two Eminent Men.

The week's obituary includes two of the most interesting figures in the British iron trade. G. Groucutt, who has died at the age of 84, was one of the most familar faces on the Birmingham Exchange, and his firm had a world-wide fame, in the good old days of the Black Country iron trade. He was the head of the large firm of Samuel Groucutt & Sons which for a long time carried on the Bradley Field Iron Works, Bankfield Iron Works, and Broadwater Furnace, Moxley. He was heavily hit by the flooding of collieries, which led to the establishment of the Mines Drainage Commission, by which numerous pits have since been freed from water. A still more famous man was Robert George Stephenson, who died last week. He was the son of Robt. Stephenson and grandson of the inventor of the locomotive. He was for many years head of the great firm of Robert Stephenson & Co. of Newcastle-on-Tyne and Hebburn.

ANOTHER OPEN SHOP VICTORY.

"This factory and all its welfare work may sink into oblivion, its buildings may stand here and rot with the doors locked and the machines idle before I will be low enough and mean enough or such a traitor to you people as to sign such a contract as that which is offered us by the Typographical Union." With this statement President John H. Patterson of the National Cash Register Co., Dayton, O., recently replied to the demand of the Typographical Union for an 8-hour day and the closed shop. Employes of the company greeted Mr. Patterson's declaration with cheers. The printers of Dayton tried for sixty days, however, to secure a strike, despite the reported advice of President Lynch of the union that no strike should be declared under any circumstances. Finally one was ordered. More than half the union compositors declined to quit, the places of the strikers have been largely filled and the incident is now closed. There is no doubt about the result in Dayton; the benefits from the open shop are evident there.

Officials of the Cash Register company were outspoken in declaring themselves as not inimical to unions. "But we are determined," said general manager Chalmers, "that no foreman's hands shall be tied to prevent him from getting rid of the men he wants to discharge, regardless of any unions." "Our policy has been," explained secretary Thomes, "to say to a man, 'you may belong to a union or not, it makes no difference to us;' but no man in our employ shall be forced into joining a labor organization if he does not want to do so."

"The 8-hour proposition is wrong," added Mr. Chalmers. "It means retrogression for this country. All we want and demand and shall have is a good day's work for a good day's pay."

A vote taken on the question of the open shop at the factory resulted in more than 75 per cent of the machinists, the craft directly interested in the labor troubles of two months ago, declaring in its favor. In other departments the vote was even more decisive.

THE FERY RADIATION PYROMETER.

In all pyrometers other than radiation pyrometers, there is some part—the sensitive or receptive part—which is made to acquire a temperature identical with the temperature to be measured. In the measurement of furnace-temperatures, for example, radiation pyrometers are the only pyrometers which are entirely outside the furnace. As is well known, it is difficult to construct anything of solid material which can be maintained for prolonged periods at a high temperature without suffering some permanent or sub-permanent change in its physical properties, and as we ascend higher in the temperature scale, the difficulties increase in a quite disproportionate degree.

A further aggravation of the trouble is to be found in the chemical activities of furnace products and furnace gases, which in some cases render difficult the adequate protection of a resistance-wire or thermo-couple.

With the radiation pyrometers invented by M. Féry, professor of physics at the Ecole de Physique et de Chimie. Paris, these difficulties are not encountered, the instruments being placed at some distance from the furnace, while no part of them is raised above the air temperature by more than 80 Centigrade degrees.

FIG. 1.—FERY RADIATION PYROMETER IN USE.

In M. Féry's pyrometers the radiation which emanates from a hot body, or which passes out through an observation hole in the wall of a furnace, falls upon a concave mirror or upon a system of lenses as the case may be, and is thus brought to a focus. In this focus is a thermo-electric couple, whose temperature is raised by the radiation falling upon it: the hotter the furnace, the greater being the rise of temperature of the couple.

The arrangement of the instruments is such that they are uninfluenced, within wide limits, by the size of the hot body or observation hole on the one hand, or on the other hand by the distance which separates them from the hot body or furnace.

The absorption of some small amount of radiant heat in passing through the atmosphere cannot, of course, be strictly without effect; but in practice the error thus arising is not appreciable; it has been found, for example, that the reading obtained for the temperature of a stream of molten steel was precisely the same—1,200° C.—whether the instrument was set up 3 ft. or 60 ft. away.

A complete instrument consists of telescope and galvanometer, fixed within the telescope. At a point upon its optic axis, is the junction of a copper-constantan thermo-couple arranged in the form of a cross. The two wires are attached to two brass strips D and R, which are attached to the terminals bb′, Fig. 2. The terminals are connected by leads to the galvanometer, as shown in Fig. 1. To use this apparatus for measuring the temperature of a furnace, an observation hole in the wall of the furnace is sighted through the eye-piece O, the image of this hole being brought into coincidence with the thermo-junction. It is essential that the image of the observation hole should slightly overlap the junction, which appears to the eye as a black disc in the center of the field of view. The readings of the instrument are then independent of the size of the observation hole.

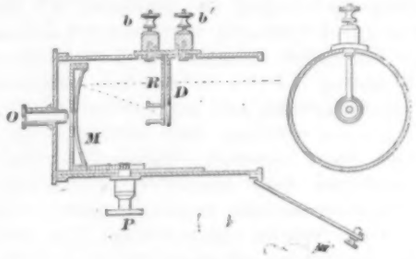


FIG. 2.—RADIATION PYROMETER.

In the mirror instrument, the image of the hole is reflected to the eye-piece O by two small plane mirrors placed close to the couple. These mirrors serve for the adjustment of focus; they are so arranged that the image of the hole appears to be split into two parts, which only blend together to form an unbroken image when the focusing is correct. Fig. 3 illustrates the changes in the appearance of the field as the focus is altered.

The image thus formed upon the junction produces a rise of temperature which is shown experimentally to be proportional to the amount of radiant energy which enters the telescope. The junction acquires exactly, and with great rapidity, the temperature of the image, but in no case does its temperature rise by more than 80 Centigrade degrees above the atmospheric temperature. The electromotive force which is thus generated is measured by a highly sensitive galvanometer, whose scale is divided and figured so as to read temperatures directly.

This galvanometer, notwithstanding its sensitiveness, is of substantial construction; it comprises a finely pivoted moving coil, provided with a long pointer. The movement of the coil takes place within a single air-gap between the poles of a strong permanent magnet. These galvanometers are invariable in their indications, and unaffected by all external influences. They are self-leveling, so that no adjustment of level is required before a reading is taken. By turning a milled head the moving coil can be freed when a reading is to be taken, or clamped to facilitate the removal of the instrument. Another milled head enables the divided scale to be unclamped, adjusted in position to a small extent, and reclamped, so that the reading is zero when no current is flowing. The galvanometer has a resistance of about 10 chms. and is connected by leads about

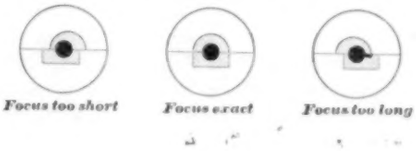


FIG.—FIELD OF FERY RADIATION PYROMETER.

30 ft. long to the terminals of the pyrometric telescope.

The gradation of the galvanometer scale is based upon Stefan's law, which expresses the relation between the temperature of a body and the amount of radiant energy which it emits. The law is as follows: "The radiant energy emitted by a perfectly black body is proportional to the fourth power of the absolute temperature of the body." This law is a mathematical deduction from the electro-magnetic theory of light.

Though no radiating surface is truly black in the theoretical sense, iron and steel exposed to the air at or above a red heat fulfil this condition very closely, and the same is true of copper, but there is also a much larger class of effectively black bodies.

If the inner wall of an enclosure E, Fig. 4, is at one temperature throughout, and if an aperture A, through which radiant heat emerges, is of small dimensions com-

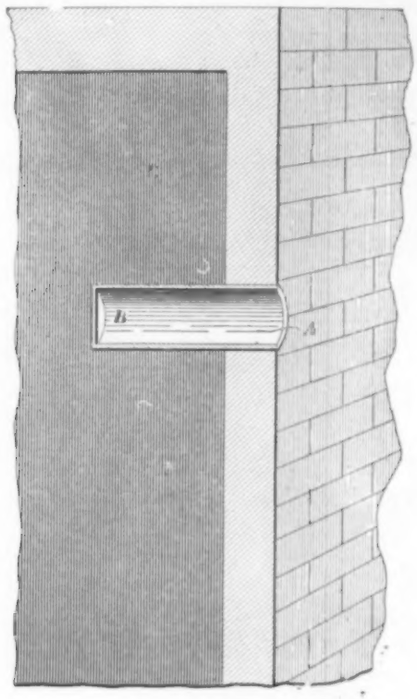


FIG. 4.—FERY RADIATION PYROMETER.

pared with the depth of the enclosure behind the aperture, then the radiation proceeding from the surface B of the enclosure will be independent of the character of the surface, and the same as if the surface B were perfectly black.

The arrangement sketched in Fig. 4 is one which is actually used in taking furnace temperatures by means of the Fery pyrometer.

Moreover, in many industrial processes, a knowledge of actual temperatures—Centigrade or Fahrenheit—is not essential, provided some standard is available which serves to distinguish between higher and lower temperatures, and enables correct heat conditions, once obtained, to be reproduced with certainty. Suppose, for example, that we are sighting the pyrometer on the metal in a crucible, and that the reading obtained on the temperature scale of the galvanometer is 1,100° C. Owing to the surface of the metal not being absolutely black this reading may be lower than the true temperature, which we will suppose is 1,180° C. If we find that the castings obtained by pouring the metal under these heat conditions are satisfactory, and better than those resulting from pouring either hotter or colder metal, we shall have reached the important practical conclusion that the correct pouring temperature for the metal in question produces a reading of 1,100° C. on the temperature-scale of the galvanometer—even though we do not know the true temperature of the metal on the Centigrade scale.

Since the energy radiated from a hot body increases very rapidly as the temperature is raised, it follows that the Fery pyrometer is far more sensitive at high than at low temperatures. Temperatures as low as 600° C. can be read, but the instrument is most useful for high temperature work. As examples of high temperature measurements made with the Fery pyrometer, mention may be made of the temperature of the sun (7,800° C.) determined by Prof. Fery, as well as the temperature of the iron in a thermit mold, which was found to be 2,500° C. The instrument is thus of especial value for taking such high temperature as those of molten steel, of gas settings, of glass furnaces, brick kilns and electric furnaces. Its great flexibility, and the readiness with which it is sighted, enable it to be used for taking the temperature of metal in a crucible just before pouring, thus insuring correct casting temperatures, a point which is now known to be of especial importance in the case of steel castings. Forgings, billets, blooms, and finished rolled sections are also readily followed through the various operations which have to be performed on them, great progress having already been made in this direction.

A point which may need further explanation is the arrangement that insures that, within limits, the readings

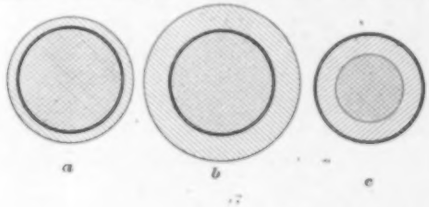


FIG. 5.—FERY RADIATION PYROMETER.

of temperature shall be independent of distance.

Suppose that we are sighting the telescope upon a hot body of limited dimensions. The total amount of radiation reaching the aperture of the lens or mirror will vary with the distance from the hot body, and will be inversely proportional to the square of the distance. If, then, the receptive surface of the thermo-junction were sufficiently extended to receive the whole of the radiation which is converged to a focus by the lens or mirror, we might expect the indications of the galvanometer to fall off as the distance was increased. The thermo-junction, however, is not large enough to receive the whole of the radiation which converges toward it. The real image of the source, formed by the lens or mirror, overlaps the thermo-junction on all sides (Fig. 5 a), so that when we approach the source more nearly, thus increasing the size of the image produced, the only effect is to increase the amount of overlapping, while the thermo-junction receives no more radiation than before (Fig. 5 b). On the other hand, if we withdraw to so great a distance that the image formed is too small to cover the thermo-junction completely (Fig. 5 c), the readings obtained will be too low, and will become lower and lower as we recede further and further from the source of heat.

From the above it will also be readily understood that when we are working at any given distance from the hot body, it is necessary for the body in question to be of sufficient size; otherwise the image of the body would be too small to overlap the thermo-junction on all sides. But provided the hot body is large enough to secure the necessary overlapping, no further increase in its dimensions will

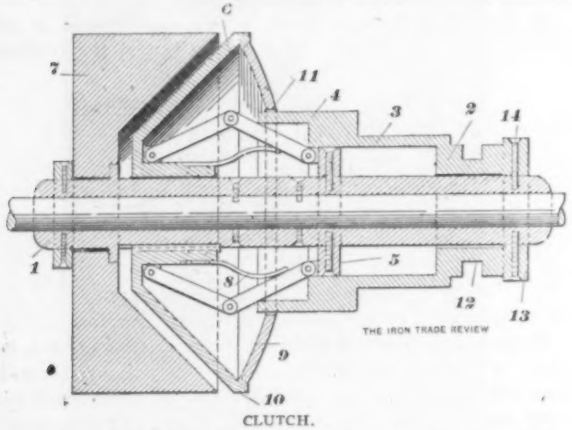
add to the amount of radiation actually received by the thermo-junction. The diameter of the hot-body (or furnace aperture) should measure as many inches as the distance from hot-body to pyrometer measures yards.

A similar galvanometer is also made and calibrated so as to measure directly low temperatures, the temperature of liquefaction of gases, liquid air, and liquid carbonic acid, or for the measurement of moderate temperatures between 0° and 600° C. In such cases the galvanometer is connected by leads to a copper-constantan thermo-couple immersed in the medium whose temperature is required. The couple is enclosed in a tube which leaves the junction exposed. These couples should never be heated above 700° C.

The sole agent for the sale of the instrument in America, Great Britain and her colonies, Norway and Sweden is the Cambridge Scientific Instrument Co., Ltd., Cambridge, England.

A New Clutch.

The clutch shown in the accompanying illustration was designed to house the working parts in an effective manner permitting convenient access for repairs, and to provide for a prompt response when the controller is moved to release the clutch. It is the invention of L. E. Gibson. A sliding controlling-sleeve 2 is mounted upon the core 1 and is provided with stepped or gradually-



CLUTCH.

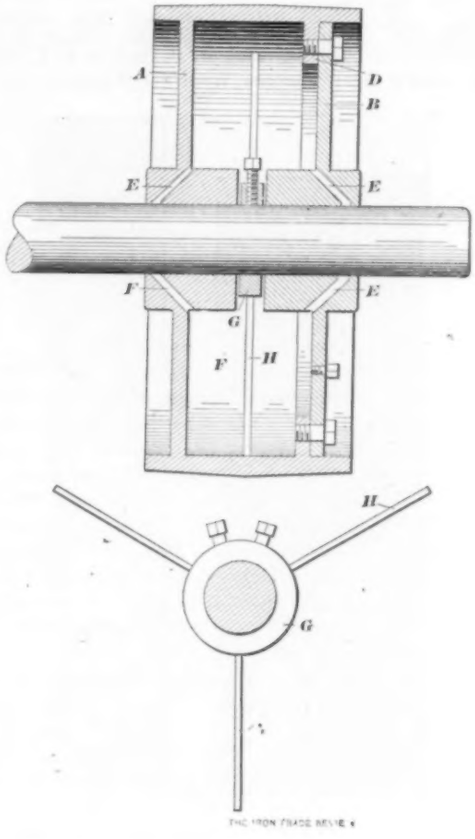
increasing cylindrical flanges 3 and 4, the flange 3 being of a diameter to work across the shoulder 5 and engage the toggle-levers, so as to bring them into alignment, and thereby slide the clutch member 6 into frictional engagement with the clutch member 7 to interlock the latter for simultaneous rotation with the core. When the sliding sleeve is withdrawn, the springs 8 immediately force the toggle-levers outward, and thereby promptly withdraw the movable clutch member 6 from the member 7, the terminal flange 4 of the sliding sleeve constituting a stop to limit the outward movement of the toggle-levers.

A removable circular shield 9 is secured within the cylindrical flange 10 of the clutch member 6, and is provided with a central opening 11 to receive the flange 4 of the sliding sleeve 2, whereby the toggle-levers are housed and at the same time access may be had thereto by removing the sleeve 2 and the shield 9. The sleeve 2 is provided with an annular groove 12 for the reception of the usual forked shifting-lever, and there is an annular stop-shoulder 13 secured upon the core by means of suitable fastening 14 to limit the outward or rearward movement of the slide.

W. B. Lowe and other New York interests have leased the Etna furnace and lands at Etna, Ga., with the privilege of purchase at $500,000. Ten thousand acres of land are included in the property.

A SELF-OILING LOOSE PULLEY.

The self-oiling loose pulley, shown in the accompanying illustration, is the invention of Andrew J. Stickler, Winfield, Ia. This pulley consists of a loose pulley frame with a web A at one side and a ring D at the other. To the ring D is bolted a flange B, which is mounted on a hub. This forms a tight chamber in the center of the pulley. Between the two portions of the hub is a ring G, from which three arms H project radially. This ring is secured to the shaft by set screws and is held stationary when the shaft is not revolving. In the hubs of the pulleys and of the flange B are oil ports E extending from the shaft



A SELF-OILING LOOSE PULLEY.

back to the oil chamber.

When the pulley commences to revolve, the oil is forced out to the rim and flows down the pipes H to the shaft. It flows outward along the shaft until it reaches the ports E through which it is returned to the oil chamber, thus making a complete circuit, which continues as long as the pulley rotates.

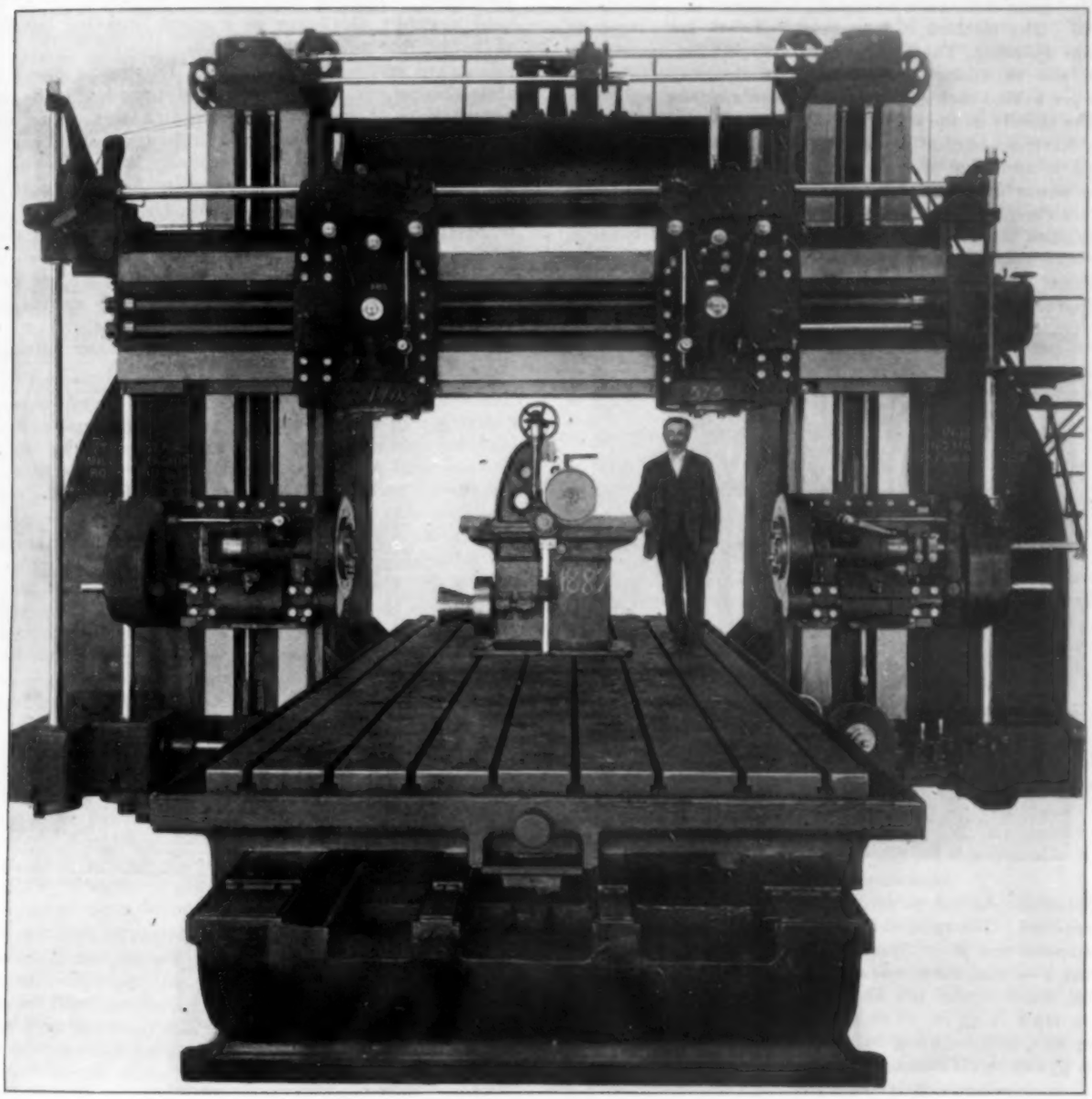
The increasing use of molybdenum steel has caused a greater demand for the ores of molybdenum. The principal properties imparted to steel by the use of molybdenum is an increase in hardness and toughness. Molybdenum steel is recommended for large forgings for marine engines, for large guns, for boiler plate, and for high-speed tool steel. Molybdenum increases the elongation of steel very considerably, and for wire drawing such an increase at a comparatively small cost is important. The limited use of molybdenum is due not so much to any question as to its value as to a steel-hardening metal, as to the comparative rarity and high cost of the ores. —[The Chemical Engineer.

A FOUR-HEAD MILLING MACHINE.

The Ingersoll Milling Machine Co., Rockford, Ill., recently built for the General Electric Co., Schenectady, New York, a 10-ft. four-head milling machine, which is shown in the accompanying illustration. The bed of the machine is 30 ft. long and travels upon four slides, two of which are broad and flat and located at the outside of the bed, and two narrow ones located between the wider guides. The guides are all provided with oil rollers insuring ample lubrication of the table bearings. The table itself is 20 ft. long and 108 in. wide over all. Its weight is 60,000 lb. the housings are wide and deep and of the box girder type. The saddles of the machine are of one type and the cutter heads have a face plate drive. The vertical heads have an independent adjustment vertically and the horizontal heads independent horizontal adjustments of 8 in. The right hand vertical and horizontal heads each carry auxiliary spindles for small face mills.

Both of the vertical saddles have independent reversible cross feeds and the right hand horizontal saddle has an independent vertical feed. The horizontal saddles are raised and lowered by power and are counterbalanced. The table feed is independent of any of the other mechanism of the machine and it is driven by a fifteen horsepower variable speed motor with a two to one variable motion. Each change of speed of the motor gives eight changes of positive feed on the machine.

The tool is provided with four motors for operating;



10 FOOT, FOUR HEAD INGERSOLL MILLING MACHINE.

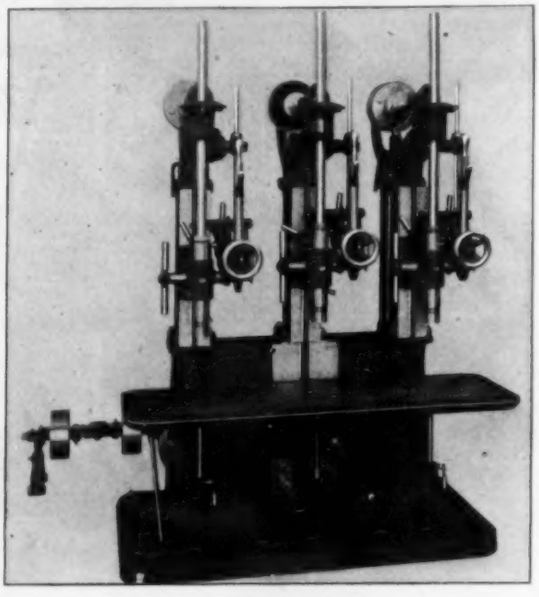
a 50-h. p. motor driving the two horizontal heads and another 50-h. p. motor the two vertical heads. A 15-h. p. motor drives the table feed and a 5-h. p. motor is used for raising and lowering the cross rail. These motors are all made by the General Electric Co. and are of the variable speed type.

Auxiliary housings are put up to support the main housings when the vertical spindles are taking a cross feed, especially if the cross rail is at a high point on the housings. The machine weighs, complete for shipping,

300,000 lb. The small milling machine shown on the platen of the larger machine is one of the earliest built by the company, and gives a good idea of the progress made in the new machine designed by the Ingersoll company. The company commenced the manufacture of this type of smaller machine in 1887.

A SLIDING HEAD GANG DRILL.

The accompanying illustration shows a 23-in. sliding head gang drill, built by the B. F. Barnes Co., Rockford, Ill. The machine can be furnished with two, three or four spindles. The sliding heads provide for adjustment to suit variations in the heights of the work. A back brace behind each spindle makes it very strong and rigid. The spindle on the left hand of the machine is shown with a reversing friction countershaft for tapping. The spindle is furnished with a plain lever, a wheel and lever, or power feed with automatic stop. The machine is also furnished with or without back gears. If desired, the spindles are driven separately from quarter turn countershafts, thus affording independent speeds and independent feeds. Reversible friction countershafts for tapping are also furnished if desired for either or both of the outside



SLIDING HEAD GANG DRILL.

spindles. An oil pump attachment is also provided as required. The total height of the drill is 85¼ in. and the spindles are 28 in. from center to center. Each spindle has a vertical travel of 12 in., the table also having a vertical travel of 14 in. The greatest distance from spindle to table is 33 in. The floor space required for a two-spindle drill is 53 x 45 in.; that required for a four-spindle is 53 x 85 in. These figures include the space taken by the countershafts. A three-spindle drill weighs about 4,400 lb.

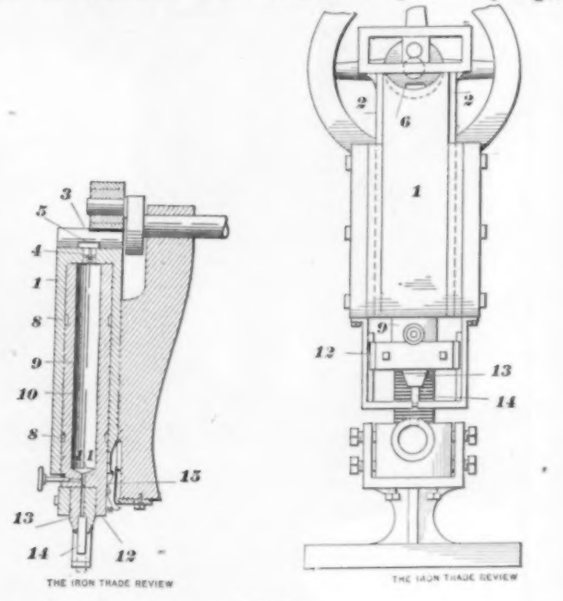
PUNCHING MACHINE.

This invention, by Edward A. Commander, is designed to improve the construction of plungers of punching machines. The particular object of the invention is to provide a plurality of telescoping plungers adapted to travel together in one direction and independently in the opposite direction, whereby the punch-carrying member is adapted to rest upon the work prior to the application of power to perform the punching operation. A further object of the invention is to provide a construction of these plungers whereby an air-chamber or cushion is provided to effect the gradual descent of one of the plunger members when released from the other, together with construction by which the plungers are automatically connected together at the downward limit of their travel.

The pressure plunger 1 as shown in the accompanying illustration is formed with a chamber and is provided with ribs 2 upon the opposite sides to travel in the guideway, while the upper portion thereof is closed at 3 and there provided with a port 4 adapted to be controlled by a valve of any desired character—for instance, a check valve 5. This valve is located in a recessed portion 6, so as to open upwardly as the air is expelled from the interior of the chamber within the plunger 1.

Disposed within the plunger is a telescoping punch 7, preferably of cylindrical form and provided with any desired form of packing, as shown at 8, to form an air-tight connection, while within the cylinder 9, an oil chamber 10 may be provided, if so desired. When this chamber is used, a duct 11 is provided in the lower portion thereof and extends to the punch. The discharge of oil is suitably controlled by a needle-valve. The lower portion of the plunger 9 is provided with a fixed rear wall 12, having a socket which is adapted to receive the two part or divided chuck-block 13. The punch 14 is carried between the clamp members of the chuck-block.

In the operation of the invention the pressure plunger



PUNCH.

1 and the punch plunger 9 rise together, as they are connected by a latch 15. When it is desired that the punch be set upon the work prior to the application of the power, a trip plate is provided to automatically release the latch as the plungers jointly ride to the upward limit of their movement. As soon as this latch is released the punch plunger begins its descent, which is retarded by the entrance of the air around the valve disposed at the upper portion of the power plunger, and the rapidity of this movement may be governed by providing means upon the valve or its seat to permit the entrance of different amounts of air to the space between the plungers. When the punch plunger is set, it rests upon the templet or upon the mark upon the work where the hole is to be punched, and the power shaft is then placed in operative relation to the power, so as to carry the power plunger downward, expelling the air above the top of the punch plunger until they are in contact, when the punching operation occurs and the material punched passes through the die and is discharged from its front.

PRESIDENT PESSANO'S ADDRESS

Work of the Year Reviewed and Important Recommendations Made.

President Antonio C. Pessano after extending a cordial welcome to all present at the convention of the National Founders' Association in New York last week, reviewed the work of the year. The business conditions had, on the whole, been more favorable than during 1904, "I believe that at no time in the previous history of the foundry industry," he said, "has the condition of activity in business and comparative quiet in the circles of our employees gone hand in hand to such an extent as during 1905." Nevertheless he urged the members to continue every effort to further strengthen the situation. The subject of profits and higher cost of material brought out the statement that severe competition had reduced the margin in the purely jobbing and machinery to a point lower than it should be and that a better understanding among proprietors as to the value of castings of different grades would prevent much of the unintelligent bidding upon work which is now so manifest.

The New Policy.

Concerning the new policy which followed the abrogation of the New York agreement in 1904, and which had now won the confidence of the most skeptical, the speaker said:

"First among our purposes and objects was the education of those men who wish to follow the trade of molding, as free men untrammeled and unhampered by the tactics of the union. In dealing with this point our most engrossing aim has been the enlightenment of these employes that they might more readily appreciate the many advantages which would accrue to them were they to pursue the learning of their trade in a manner which would fit them to command the highest rate of compensation measured entirely by their skill and ability to produce work. We have attempted most aggressively to place before these men the fallacy of permitting their progress to be stunted and barred by the rates of compensation and other liberties which unionism endeavors to secure for the inferior workman.

Protection for Employer and Employe.

"The second of our objective points under the new policy was taught us by our experience in combating strikes. The inauguration of a strike has carried with it in the past the employment by the unions and their sympathizers, of professional sluggers, murderers and intimidators to such an extent that these terms have now come to be accepted as synonymous. The employers' association of today occupies a most unique position in that its manifest duty is the protection of the interests both of the employer who gives it support, and also of the employe. When giving our consideration to the irreconcilable position assumed by the labor leaders, and the rules and regulations they are attempting to foist upon us, we must not neglect the duty of keeping in the right track the employer who may possibly be inclined to overstep the bounds of reason in refusing to listen to or adjust requisitions made by the employe for his consideration. In other words, the 'big stick' of the National Founders' Association should be intended alike for the unscrupulous agitator and the unprincipled employer. The employer, in looking for a good, square deal for himself, must also see that the employe is given the same treatment.

"Our third objective working point has been the establishment of a thoroughly competent force of skilled workmen, in charge of a working foundry superintendent, upon whom our members might depend in case of strikes. We have attempted in the organization of this force to secure the services of men who are competent, not only to get a foundry into working order, but to take charge of other men who might be employed, and instruct them in the art of molding. Many of our members during the past year have had reason to appreciate the services rendered by this branch of the association staff. The plan is one which has never been tried by any other organization, and the N. F. A. is consequently a pioneer in the field; this has necessitated the carrying on of the work without the guidance or the experience of others as an assistant. Of the success of this method of retaining the services of faithful men, however, there can now be no doubt. As time goes on, certain details will be perfected, and the time is not far distant when we will have at our command a sufficient force to man the largest foundry within the membership of the association upon 24 hours' notice."

President Pessano recommended the establishment of other branch headquarters similar to the Philadelphia office; related the steps which had been taken toward bringing about closer relations with the National Metal Trades Association; referred to the gratifying increase in membership of the N. F. A., there being 78 new members representing a capitalization of about $8,000,000; called attention to the sound financial condition of the association; indorsed the forming of foremen's associations; recommended that the advisability of electing Pacific coast foundrymen to membership be considered; and described the special secret service of the association. Concerning the decline of unionism among high grade workmen, Mr. Pessano said:

Decline of Unionism.

"The arguments of the union agitator for the retention in the ranks of the unions of the high grade workmen in our plants have lately suffered some severe drawbacks. The consistent movement of education which has been carried on for the benefit of these men is beginning to have its effect. Naturally the most skilled element of artisans is not primarily inclined to affiliate with unions, but finds it necessary at times because of the various methods in the way of physical and other force employed by the lower element of unionism, to ally itself for the time being with an organization of that nature.

"For this reason I beg to impress upon our membership in the strongest possible terms the obligations they are under to encourage that portion of their employes which is of higher skill, and consequently entitled to greater renumeration, by affording to these men every possible consideration and protection. By this means the employer quite naturally will gather about him a force which is not dependent upon the union for its support.

"There is a growing and well defined tendency at the present time on the part of the better grade of workmen to make their own terms with the employer, rather than to leave these terms to be made by a third individual, who in only exceptional instances has any knowledge of the equities of the case in hand."

In concluding, Mr. Pessano thanked the officers of the association for their support and paid a high tribute to Commissioner Briggs, of whom he said in part:

"For the untiring and unremitting zeal of the commissioner, the association is greatly indebted. Notwithstanding serious illness in his family, which made it impossible for him to give his entire time to the work, and although absent from the office part of the time, his mind has always been with us, and I have had more than one occasion to appreciate this when inadvertently discovering some important work in which he has been engaged. He has practically directed all of the actual field work of the association staff, and at no time did any of it lack for thoughtful attention, as the year's results clearly show."

COMMISIONER BRIGGS

Tells of the Decline of the Iron Molders' Union and the Success of the New Policy.

In his report to the convention of the National Founders' Association in New York, Commissioner O. P. Briggs said that time had proved the wisdom of the abrogation of the New York agreement with the Iron Molders' Union. He added:

"During the fiscal year of 1904, the association undertook to settle numerous difficulties with the union by virtue of the then existing New York agreement. Every one of those attempts at settlement failed. The union steadfastly maintained that every shop must be operated strictly in accordance with its antiquated constitution and by-laws. During the fiscal year of 1905, without the intervention of any agreements whatever between the members of this association and the union, a very large number of difficulties have been settled, and in nearly every case satisfactorily to our members. In making all of these settlements, our members are to be congratulated upon the loyalty with which the policy laid down by the association has been maintained and the results obtained thereby. In general the output has been increased materially.

"Many of the strongest supporters of the New York agreement in years gone by now admit that it was the means of building up the Iron Molders' Union. From the best information obtainable, it is believed when the agreement was first promulgated, the union had about 17,000 members. At the time the agreement was abrogated, it had about 86,000 members. Since then we are reliably informed the membership has dropped to less than 50,000.

"You will also note from the report of the secretary that during the past year, we have taken in a large number of members, some 78 in all. The class of membership we have received during the past year, as well as the number of foundries, in my judgment, is far in excess of anything that has taken place heretofore in the experience of the association. Some members have been dropped. Nearly the entire loss has been occasioned by foundries going out of business, financial difficulties or sales of plants."

Loyally Supporting Workingmen.

"At this point I am prompted to suggest that our members in a very marked degree have followed the advice and suggestions of the officers of the N. F. A. in paying more attention to the condition and environment of the honest workingmen of this country, and to also call your attention to the methods suggested by the association for the protection of this class of workmen.

"Immediately following the murder of Mr. Weakley at Cincinnati in 1904, the council directed that the most aggressive action possible be taken by the association in bringing to justice the perpetrators of this crime. Considerable amounts of money and a great deal of energy have been put forth in this direction, and, as has been announced to you by special circular and the Review, the man who actually committed the crime was placed behind the bars under a 20-year sentence. The details of bringing this man to justice would require too much time to be placed before you at this moment.

"I believe the orders of your council have been complied with to the greatest extent possible, and I wish to report the good effects such action has had upon the honest workingmen of the country in that it is tangible evidence that this association proposes to protect them.

"In many localities these workingmen know it is impossible for them to receive protection at the hands of municipal authorities. They know that politics often plays so important a part in labor negotiations that the municipal officers are remiss in their duties to such an extent that a man who dares work in an open shop has no protection whatever.

"On the face of it, it seems farcical for a manufacturers' association to be brought face to face with municipal officers who fail to do their duty, by allowing all kinds of intimidation and crime to be perpetrated upon an independent workingman. How an officer of the law can conceive it to be his duty to take sides in this issue as to favor a class of men who do not represent to exceed 12 percent of the workingmen of the country, is beyond my comprehension. I am compelled to report to you that such has been the case on numerous occasions, and I now wish to suggest the importance of thorough protection to the honest workingmen particularly in two directions.

Duty of Association Members.

"First. That each and every member of this Founders' Association make it his personal business to see that the faithful, law abiding, honest workman of his foundry be granted everything that is his right. See to it that his wages are what they ought to be. Do not allow the skilled men to be reduced to the level of the minimum wage principle. Deputize some officer or stockholder of your large corporations to take a personal interest in the welfare of these high grade men, and assist your managers, superintendents and foremen in their behalf.

"Second. Use every effort within your power to see to it that such men are placed in office in your community as will remain neutral on this labor question, but who will fearlessly and energetically carry out the oligations they take to maintain law and order when assuming the duties of their office. And whenever in your community a workingman is abused by reason of non-protection by the municipal officers, see that such officer is promptly called to account. It matters not whether the neglect of duty affects your own men or your neighbors', join with them and bring the culprits to justice.

"If the employers of labor throughout the United States and Canada will see to it that these two points are safeguarded to the greatest degree, the time will soon be at hand when their strongest allies (the honest workingmen) will come out fearlessly and boldly, taking an effective and decided stand against the unjust action of radical unions. Too much cannot be said upon these two important subjects.

"In view of my retiring from this office at the close of the present convention, I wish to make the following recommendations:

"That a few more field men be employed, as many as may be consistent with good management; that the present method of employing molders by the year to assist our members in times of trouble be maintained and enlarged to a reasonable extent; that a small branch office be maintained at some desirable point in the east and that your council consider establishing a similar office in Chicago; that every effort within your power be exercised in protecting and advancing your honest, industrious men; that you exercise greater care in selecting and educating your apprentices; that you pay your skilled men all you can possibly afford to pay them, investigate personally the slightest complaint of this class of men, protect them from all forms of violence and intimidation, unrelentlessly follow the murderer, the slugger and the intimidator until justice is meted out to him; foster the individual contract to the greatest possible extent; use every effort to convince your employes of the iniquity of the minimum wage principle and the limit of the workman's earning capacity, the two greatest curses of unionism as practiced in this country."

NEWS FROM MANY INDUSTRIES.

New Buyers:—

The Watson Iron & Steel Co., Paden City, Tenn., has been incorporated with $100,000 capital stock.

The Mallory & Taylor Iron Works, Macon, Ga., have increased their capital stock from $25,000 to $200,000.

The Wald Machine Co., Boston, has been incorporated with a capital of $25,000. The officers are: president, Gustav H. Wald, and treasurer, Christian Wald, both of Boston.

The Youngstown Pressed Steel Co., Youngstown, O., has been incorporated by L. E. Cochran, G. F. Danielson, J. O. Pew, Mason Evans and Henry W. Heedy. The capital stock is $60,000.

The Pettingill Machine Co., Boston, Mass., has been incorporated with a capital of $35,000 to deal in machinery. The officers are: president, F. A. Ewell, Boston; treasurer, W. H. Taylor, Amesbury.

The Machine Tool Exchange Co., Cincinnati, O., has been incorporated with $10,000 capital stock by Graham P. Hunt, Russell Wilson, Alfred Bettmen, Hart Hantery and Edward P. Moulinier.

The Commonwealth Machine Co., Worcester, Mass., has been incorporated to deal in machinery with a capital of $10,000. The officers are: president H. W. Smith, and treasurer, F. S. Blanchard, Worcester.

The Briggs Iron Works, Chicopee Falls, Mass., has been incorporated with $3,000 capital stock to conduct a general foundry business. The officers are: president, G. H. Babbit; treasurer and clerk, G. W. Briggs.

The Dixon-Pocahontas Fuel Co., Macdonald, W. Va., has been incorporated with $200,000 capital stock by S. Dixon, J. W. Smiley, W. K. Smiley, James Faulkner and F. W. Scarborough to mine coal and manufacture coke.

The American Metals Co., Santa Fe, N. M., has been incorporated with $1,000,000 capital stock. The incorporators are: E. P. Warner, J. F. Primley, W. J. Merrill, W. T. Weir, C. H. Lem, E. A. Franke and E. R. Stephens. The New Mexico office is at Lascruces.

The Baltimore & Ohio Equipment Co., Wilmington, Del., has been incorporated with a capital of $1,000,000 to deal in rolling stock and railroad equipment. The incorporators are: Andrew E. Sanborn, Henry A. Miller and Robert M. Burns, all of Wilmington.

The Republic Metal Ware Co., Buffalo, N. Y., has been incorporated with a capital of $1,500,000 to manufacture and trade in tin, sheet iron and enameled ware. The incorporators are: Evan Hollister, Irving L. Fisk, Edward M. Mills, Sidney Detmers, Franklin Agge, all of Buffalo.

The American Scrap Iron Co., Akron, O., has increased its capital stock from $25,000 to $50,000. Jacob Adler, president of the company, is authority for the statement that a number of improvements will be made in the near future which will enable the company to do business on a much larger scale.

The 3—B—S Stove Co., Beaumont, Tex., has been incorporated to operate a stove foundry. The incorporators are: E. W. Semple, A. R. Brown, Lon A. Bernard and John H. Broocks. The company has purchased the plant of the Gem Stove Co., at West Point, Miss., which it intends removing to Beaumont.

The Belting & Machinery Mfg. Co., Rochester, N. Y., has been incorporated to manufacture machinery, belting, etc., with a capital of $150,000. The incorporators are: W. F. Welch, 205 West 109th street; J. B. Smith Jr., 7 East Forty-third street; T. J. Maccabe, 178 West Ninety-fourth street; G. S. Ludlow, 123 West Sixty-ninth street, all of New York, and R. S. Batson, 57 Irving avenue, Brooklyn.

The United States Electric Tool Co., Columbus, O., has been incorporated with a capital stock of $25,000. The incorporators are: William A. McAllam, D. J. Hauss, J. A. Smith, C. F. Kleinschnidt and G. H. Felter. The company was formerly a Kentucky concern and has but recently removed to Columbus where it will manufacture electric tools.

The Katonka Iron Co., has been incorporated for the purpose of operating on the Menominee range. The capital stock is $1,000,000. The officers are: president, F. J. Hathaway, Philadelphia; vice president, William H. Mercer, Toronto, Ont.; secretary and treasurer, T. D. Ramkin, Toronto, Ont.; general manager of the National Mercantile Co.; superintendent, John Cuff, Norway, Mich.

The National Engineering Co., Columbus, O., has been incorporated with $100,000 capital stock by J. S. McGrew, H. D. Bruning, C. E. Sherman, F. C. Caldwell, E. A. Hitchcock and Joseph N. Bradford. Nearly all the incorporators are members of the engineering faculty of the Ohio State University. The company will do engineering and architectural work of every kind. The officers are: president, J. A. McGrew, formerly connected with the Pennsylvania and Rock Island railroads; vice-president, H. D. Bruning, assistant professor of civil engineering at Ohio State University; and secretary and treasurer, F. C. Caldwell, professor of electrical engineering at Ohio State. The company has been organized into departments with specialists in charge of each.

New Construction:—

The Charles A. Stickney Co., St. Paul, Minn., is erecting a foundry building at a cost of $10,000.

The American Pin Co., Waterbury, Conn., has prepared plans for another large factory building.

The Northwestern Barb Wire Co., Sterling, Ill., has completed a large addition to its office building.

The Gauley Mountain Coal Co., New York, has begun the construction of its 500 oven coke plant near Ansted, W. Va.

The Alabama Consolidated Coal & Iron Co., Birmingham Ala., is to build 50 additional coke ovens at Lewisburg in addition to the 50 already contracted for.

The Harlan & Hollingsworth Corporation is soon to begin operations on the new car shop at Wilmington, Del. The building which will be of brick and steel will be 90 x 500 ft.

The Hetherington & Berner Co., Indianapolis, Ind., will erect a new foundry on a tract of 3½ acres recently acquired. The new location affords excellent railway shipping facilities.

The Lattimer-Williams Mfg. Co., Columbus, O., intends erecting an addition to its foundry, a ware-room and storage building and a new cleaning room. The company manufactures stoves and ranges.

The Iowa Iron Works, Fort Smith, Ark., will erect a plant for the manufacture of ore cars, mining machinery and tools, and also a foundry for making castings of all kinds. The company should be addressed in care of the Commercial Club.

The Western Iron Mills Co., Denver, Colo., will have its plant, now being constructed on the Colorado & Southern tracks, in operation shortly. The plant is 100 x 400 ft. and will have a capacity of 150 tons, turning out light rails, shafting and other iron and steel products from

scrap. The officers of the company are: John S. Cary, president; Robert J. Cary, vice president, and James T. Ritchie, secretary and treasurer.

The J. P. Rundle Mfg. Co., Milwaukee, Wis., is preparing plans for improvements at its plant to cost $30,000. A one-story addition 85 x 113 ft. will double the capacity of its foundry. A new melting and refining building, a brass finishing building, an office building and shipping depot are also to be constructed.

A. C. Dustin, president and treasurer of the Fort Smith & Western Railroad, Cleveland, states that in the near future the company will construct 100 additional coke ovens at McCurtain, I. T., which will bring the capacity of the plant there up to 48,000 tons per month. The company has authorized the purchase of 100 box cars of 80,000 lb. capacity and also the opening of its mine No. 3.

The National Wire Corporation, New Haven, Conn., has a number of improvements under way which will greatly increase the capacity of the works. A galvanizing building 125 x 250 ft. and other smaller buildings for special purposes are being erected and a number of alterations made in the space formerly devoted to hospital and club room. Considerable additional machinery is being installed.

The Fayette Coke Company and J. H. Hillman, of Pittsburg, have purchased the plant of the Century Coke Company, near Brownsville, Pa., for $507,000, and will soon let contracts for the construction of 200 additional ovens. property consists of 350 acres of coal land and 30 ovens now in operation. New boilers, machinery and buildings will be erected. The new company took control November 1.

Fires.—

The Genesee Tack Co., Rochester, N. Y., which sustained a loss of $5,000 by fire Oct. 19, was forced to suspend operations for ten days, but now has its mill in full operation.

The plant of the Toledo Wire & Iron Works, Toledo, O., was gutted by fire Nov. 16. Oil and paint stored in the cellar became ignited and hindered the work of the firemen.

A rolling mill at the plant of the American Bridge Co., Wilmington, Del., was destroyed by fire Nov. 9, but the flames were prevented from damaging other parts of the plant.

The Davis-Farnum Mfg. Co., Waltham, Mass., has replaced the damage wrought by a recent fire and is now operating in all departments. Practically no machinery was destroyed.

The British Columbia Wire & Nail Co., Vancouver, B. C., recently sustained a loss of about $100,000 when its plant was completely destroyed by fire. The plant will probably be rebuilt.

Work has been begun on the construction of a new foundry, 60 x 176 ft., on the site of the Wenzelmann Mfg. Co's plant at Galesburg, Ill., recently destroyed by fire. Pattern makers are busy replacing the damage in that part of the plant.

The plant of the Riverside Bridge Co., at Martins Ferry, O., was visited by fire early on the morning of Nov. 17, and damage estimated at more than $200,000 was caused. Iron and steel buildings, regarded as fireproof, were completely destroyed. The offices of the company are at Wheeling, W. Va.

The Dickson Car Wheel Co., Houston, Texas, is erecting a $5,000 building to serve as a temporary wheel foundry, replacing the structure recently destroyed by fire. A double shift of men will enable the company to catch up with back orders. The rebuilding of the plant on an extensive scale is being planned.

General Industrial Notes :—

The Interstate Commerce Commission has ruled that after Aug. 1, 1906, the minimum of air-braked cars in trains shall be 75 percent.

The Henry E. Weaver Coal Co., Chicago, has leased the coking plant at Waldensia, Tenn., of the Chicago-Tennessee Coal and Coke Co.

Repairs and improvements to cost $275,000 are in progress at the Genesee blast furnace, Charlotte, N. Y. It is hoped that the work will be completed by Jan. 1.

Conditions approaching a labor famine are reported in the Southern iron field. Five thousand more workmen, it is estimated, are needed in the Birmingham district alone.

M. Zalk, proprietor of the Duluth Iron & Metal Works, has purchased machinery from the old car works in West Duluth, Minn., and will extend the business of his car and locomotive repair works.

The plant of the West Virginia Bridge & Construction Co., Wheeling, is to receive additions which will practically double its capacity. A large quantity of new machinery will be installed.

The main offices of the Independent Steel & Wire Co. have been removed to the House building, Pittsburg. An office and factory are still retained in Chicago and a New York office is being opened.

The mineral lands of the old Cornelia furnace, comprising about 3,200 acres in Jackson and Vinton counties, Ohio, have been transferred by Edwin Jones, as trustee, to the See Kay Coal Co., a syndicate of eastern capitalists.

The Duplex Metals Co., New York, will operate the plant of the Combination Steel Co., at Chester, Pa. The Duplex company has just been incorporated with a capital stock of $3,000,000 with Byron E. Eldred, New York, at its head. It will manufacture steel specialties.

The Reliance Edge Tool Co., recently organized at Younstown, O., with a capitalization of $75,000, will locate its plant in the Crab Creek district. Charles McCarty is to be general manager of the mechanical department and G. E. Dudley in charge of executive affairs.

The Harvey Steel Co. has been given a judgment for $650,000 against the United States, that amount representing the royalty due the company under a contract entered into in 1900 whereby the government was permitted to use the Harvey patents in the manufacture of steel armor plate for war vessels. The decision was rendered by the United States Court of Claims.

The Cadillac Motor Car Co., Detroit, Mich., has acquired the entire business and interests of the Leland & Faulconer Mfg. Co. and the Cadillac Automobile Co. The policy of the new company will be controlled by substantially the same officers and management that directed the affairs of the constituent companies. The Leland & Faulconer plant is devoted to motor construction.

Pawling & Harnischfeger, Milwaukee, have secured the contract for the entire electric crane equipment for the extensions to the Allis-Chalmers Co.'s West Allis shops. The contract calls for 34 overhead traveling cranes with a total rated lifting capacity of 742 tons. Other orders recently entered for electric cranes are: Milwaukee Bridge Co., one five-ton; Illinois Steel Co., two 15-ton; Superior Steel Co., one 25-ton; American Locomotive Works, two 40-ton; Ohio Quarries Co., two 10-ton; Edison Electric Illuminating Co., one 20-ton; Locomotive & Machine Co., of Montreal, one 10-ton; Phillipsburg Sheet & Tin Plate Co., one 20-ton; Power & Mining Machinery Co., one 10-ton; American Car & Foundry Co., one 10-ton; Chalmers & Williams, one 15-ton; Standard Steel Works, one 20-ton and one 10-ton.

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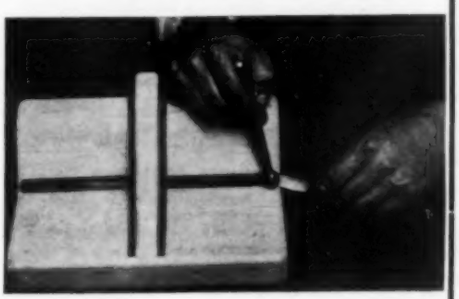

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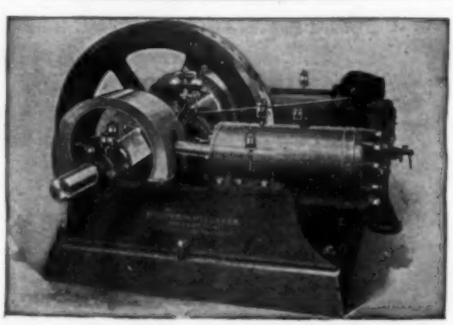

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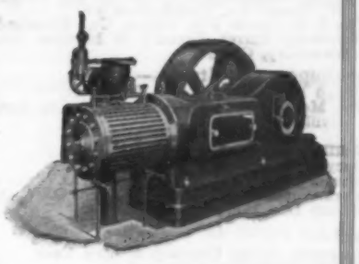

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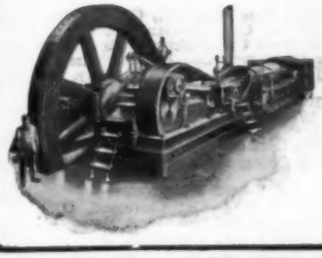

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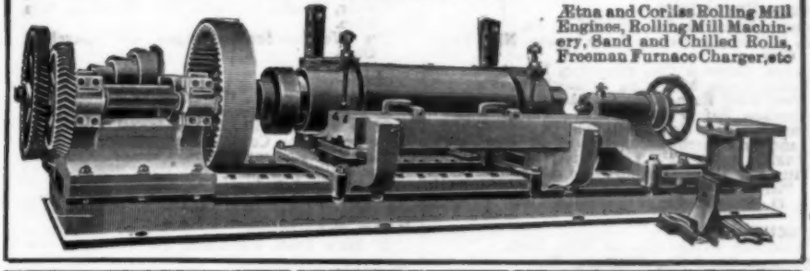

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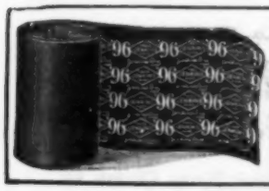

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Bullard Machine Tool Co., Bridgeport, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
Niles-Bement-Pond Co., New York.

Tool Steel—
Armstrong Bros. Tool Co., Chicago, Ill.
Bourne-Fuller Co., Cleveland, O.
Colonial Steel Co., Pittsburg, Pa.
Arthur C. Harvey Co., Boston, Mass.
Wm. Jessop & Son, New York City.

Transmission Equipment (Power)—
T. B. Wood's Sons, Chambersburg, Pa.

Tropenas Process—
Powell & Colne, New York City.

Trucks, Cars and Barrows—
Atlas Car & Mfg. Co., Cleveland, O.
The Cleveland Car Co., West Park, O.
Hill & Griffith Co., Cincinnati, O.
Arthur Koppel Co., New York City.
The Meehan Boiler & Construction Co., Lowellville, O.
Northern Engineering Works, Detroit, Mich.
S. Obermayer Co., Cincinnati, O.
Russel Wheel & Fdy. Co., Detroit, Mich.
The J. D. Smith Fdy. Supply Co., Cleveland.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.
The Wellman-Seaver-Morgan Co., Cleveland, Ohio.

Tubes—
Bourne-Fuller Co., Cleveland, O.
S. Fix's Sons, Cleveland, O.
Globe Rolling Mill Co., Cincinnati, O.
National Tube Co., Pittsburg, Pa.
Joseph T. Ryerson & Son, Chicago, New York and Pittsburg.
Scully Steel & Iron Co., Chicago, Ill.
Shelby Steel Tube Co., Pittsburg, Pa.

Tube Welding—
S. Fix's Sons, Cleveland, O.

Tumblers—
The Adams Co., Dubuque, Ia.
The Globe Mach. & Stamping Co., Cleveland, O.
Hill & Griffith Co., Cincinnati, O.
Northern Engineering Works, Detroit, Mich.
The S. Obermayer Co., Cincinnati and Chicago.
J. W. Paxson Co., Philadelphia, Pa.
The J. D. Smith Fdy. Supply Co., Cleveland.

Tungsten (Metal and Alloys)—
Beaver Metallurgical Co., Beaver Falls, Pa.

Turnbuckles—
Bourne-Fuller Co., Cleveland, O.
Cleveland City Forge & Iron Co., Cleveland, O.
A. G. Hathaway & Co., Cleveland, O.
New Jersey Fdy. & Mach. Co., New York City.
Republic Iron & Steel Co., Chicago, Ill.

Twist Drills—
The Cleveland Twist Drill Co., Cleveland, O.

Vises—
Hanna Engineering Works, Chicago, Ill.
Merrill Bros., Brooklyn, N. Y.
Wyman & Gordon, Cleveland, O., and Worcester, Mass.

Washer Machines—
National Machinery Co., Tiffin, O.

Washers—
American Iron & Steel Mfg. Co., Lebanon, Pa.
Avery Stamping Co., Cleveland, O.
Milton Mfg. Co., Milton, Pa.
Upson Nut Co., Cleveland, O.

Water Softening Plants—
Harrison Safety Boiler Works, Philadelphia.

Wire (Cable and Rope)—
Lidgerwood Mfg. Co., New York City.

Wire Nail Machinery—
National Machinery Co., Tiffin, O.